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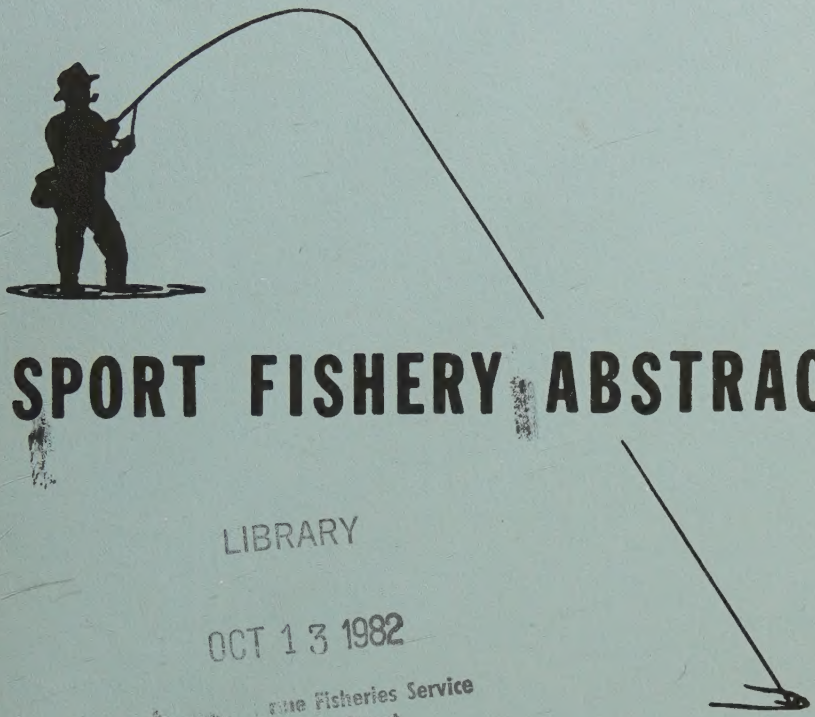

# SPORT FISHERY ABSTRACTS

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DEPARTMENT OF THE INTERIOR
U. S. FISH AND WILDLIFE SERVICE

UNITED STATES DEPARTMENT OF THE INTERIOR

# SPORT FISHERY ABSTRACTS

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*Terry N. Sexson, Assistant Editor*

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U.S. Fish and Wildlife Service
Aylesworth Hall, CSU
Fort Collins, Colorado 80523

*Sport Fishery Abstracts* is intended to furnish fishery biologists with abstracts of current literature in sport fishery research and management.

One volume, consisting of four numbers, is issued each year. Each number contains separate Author, Geographic, and Taxonomic indexes, and the final number of each volume contains cumulative Author, Geographic, Taxonomic, and Subject indexes, and a list of publications screened. Authors who publish in journals not screened for *Sport Fishery Abstracts*, and who would like their publications included, should submit abstracts to the Editor.

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# SPORT FISHERY ABSTRACTS

An abstracting service for fishery research and management

Volume 27 Number 3 1982

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GENERAL FISH CULTURE

82-001278 Arrignon, J. C. V. REGARDS SUR L'AQUACULTURE MONDIALE. [SOME COMMENTS ON AQUACULTURE WORLD-WIDE.] *Aquaculture* 27(3):165-186. Apr. 1982. In French with English summ. SFA 27(3)
[Dev. Pêche, Piscicult. Aquacult., B.P. 494, Bouaké, Ivory Coast]

82-001279 Coche, A. G., (compiler). AQUACULTURE IN MARINE WATERS. A LIST OF REFERENCE BOOKS, 1961-1981. *FAO Fish. Circ.* No. 723. Rev. 1. vii + 18p. Feb. 1982. SFA 27(3)
[FAO of the UN, Rome, Italy]

82-001280 Roys, R. S. ISSUES, PROBLEMS AND SOLUTIONS RELATING TO ALASKAN AQUACULTURE. *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:212-218. 1981. SFA 27(3)
[Alaska Dep. Fish Game, Juneau]

82-001281 Sarig, S. FISHERIES AND FISH CULTURE IN ISRAEL IN 1980. *Bamidgeh* 34(1):3-19. Mar. 1982. SFA 27(3)
[Lab. Res. Fish Dis., Nir-David, Israel]

82-001282 Toffoli, E. V. RESOURCE MANAGEMENT THROUGH THE USE OF AQUACULTURE IN CALIFORNIA. *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:205-207. 1981. SFA 27(3)
[Calif. Dep. Fish Game, Sacramento] Since the 1870's, California has endeavored to provide management programs to sustain its fish and wildlife resources. As a result of manipulation of existing water resources, loss of habitat and a steadily increasing population, the state has had to rely more and more on aquaculture techniques to maintain our fisheries. Artificially reared fish and shellfish have been planted in our waters to reduce the pressure on native populations and to provide new fishing opportunities in artificial impoundments in water-deficient areas of the state. Experimental programs are now being conducted to determine if enhancement programs are also possible for our estuarine and marine areas.

TROUT AND SALMON CULTURE

82-001283 Garrell, M. H. and L. E. Strait. SEEFORELLEN IN NEW YORK. *N.Y. Fish Game J.* 29(1):97-100. Jan. 1982. SFA 27(3)
[Phys. Dep., Adelphi Univ., Smith Ave., Garden City, NY 11530]

TROUT AND SALMON CULTURE (CONTINUED)

82-001284 Gladson, J. OCEAN SALMON RANCHING PRIVATE AQUACULTURE IN OREGON. *Oreg. Wildl.* 37(6):3-9. June 1982. SFA 27(3)

82-001285 Sower, S. A.; C. B. Schreck and E. M. Donaldson. HORMONE-INDUCED OVULATION OF COHO SALMON (*ONCORHYNCHUS KISUTCH*) HELD IN SEAWATER AND FRESH WATER. *Can. J. Fish. Aquatic Sci.* 39(4):627-632. Apr. 1982. In English with French summ. SFA 27(3)
[Dep. Zool., Univ. Wash., Seattle 98195]

OTHER ANADROMOUS SPECIES CULTURE

82-001286 Parmley, D. A COMPARISON OF THREE POND MANAGEMENT PROGRAMS UTILIZED TO PRODUCE STRIPED BASS. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:19-33. 1981[1982]. SFA 27(3)
[Tex. Parks Wildl. Dep., Possum Kingdam Fish Hatchery, Graford 76045]

WARMWATER CULTURE

82-001287 Adelman, I. R. ENHANCEMENT OF GROWTH OF COMMON CARP BY INJECTION OF A HOMOGENATE OF CARP PITUITARY GLANDS. *Prog. Fish-Cult.* 44(2):94-97. Apr. 1982. SFA 27(3)
[Dep. Entomol. Fish. Wildl., Univ. Minn., St. Paul 55108]

82-001288 Brooks, M. J.; R. O. Smitherman; J. A. Chappell and R. A. Dunham. SEX-WEIGHT RELATIONS IN BLUE, CHANNEL, AND WHITE CATFISHES: IMPLICATIONS FOR BROOD STOCK SELECTION. *Prog. Fish-Cult.* 44(2):105-107. Apr. 1982. SFA 27(3)
[220-A Dexter Arms, Playa de Coco, Guanacastel, Costa Rica]

82-001289 Brown, S. W. and C. E. Boyd. OFF-FLAVOR IN CHANNEL CATFISH FROM COMMERCIAL PONDS. *Trans. Am. Fish. Soc.* 111(3):379-383. May 1982. SFA 27(3)
[Dep. Fish. Allied Aquacult., Agric. Exp. Stn., Auburn Univ., AL 36849]

82-001290 Bry, C. and Y. Souchon. PRODUCTION OF YOUNG NORTHERN PIKE FAMILIES IN SMALL PONDS: NATURAL SPAWNING VERSUS FRY STOCKING. *Trans. Am. Fish. Soc.* 111(4):476-480. July 1982. SFA 27(3)
[Lab. Physiol. Poissons, Inst. Natl. Rech. Agron., 78350 Jouy-en-Josas, France]

82-001291 Dadzie, S. SPECIES COMBINATION IN TILAPIA CULTURE. *Aquaculture* 27(3):295-299. Apr. 1982. SFA 27(3)
[FAO Afr. Reg. Aquacult. Cent., P.M.B. 6165, Port Harcourt, Nigeria] Preliminary determinations for the best species combination for the fastest rate of growth of *Tilapia nilotica (Sarotherodon niloticus)* and *T. zillii* indicated that *T. nilotica* grew better (1.3 g/day) when raised

WARMWATER CULTURE (CONTINUED)

82-001291 CONTINUED with *T. zillii* (0.9 g/day) and common carp, *Cyprinus carpio* (3.2 g/day). In other nonreplicated experiments involving *T. nilotica* and *T. zillii* only, growth rates of 1.0 g/day and 0.9 g/day were recorded respectively which bettered those observed in monoculture experiments, namely 0.8 g/day and 0.6 g/day respectively.

82-001292 Dia, A. K. ETUDE DE LA CROISSANCE DES JUVENILES DE *CHRYSICHTHYS WALKERI* (GÜNTHER) EN ETANG EN FONCTION DE LA DENSITE. [A STUDY OF THE GROWTH OF JUVENILES OF *CHRYSICHTHYS WALKERI* (GÜNTHER) IN PONDS IN RELATION TO DENSITY.] *Aquaculture* 27(3):187-195. Apr. 1982. In French with English summ. SFA 27(3)
[Cent. Rech. Oceanogr., B.P.V 18, Abidjan, Ivory Coast]

82-001293 Dunham, R. A. RESPONSE TO SELECTION AND REALIZED HERITABILITY FOR BODY WEIGHT IN THREE STRAINS OF CHANNEL CATFISH GROWN IN EARTHEN PONDS. *Ph.D. dissertation, Auburn Univ.* 58p. 1982. From Diss. Abstr. Int. B Sci. Sci. Eng. 42(10):3892. Apr. 1982. SFA 27(3)
Response to selection and realized heritability for body weight were determined for three strains of channel catfish grown in earthen ponds at 7,500/ha. The three populations, Rio Grande (Texas), Marion (Alabama), and Kansas (Kansas), had different histories of domestication, 10 years, 20 years, and 60 years, respectively. At a harvest weight of approximately 500g, the largest 10 percent of each population was selected. The growth performance of progeny from selected fish was compared to that of progeny from randomly chosen fish. Significant responses to selection ($P<0.001$) of 63, 73, and 54g (17, 18, and 12 percent increase in body weight) were obtained from Rio Grande, Marion, and Kansas strains, respectively. Response was higher for Marion than for Kansas ($P<0.001$) and Rio Grande ($P<0.05$). Generally, the fish with the least amount of domestication had the highest response. Realized heritability for Marion, 0.50±0.13, was higher ($P<0.01$) than that for Rio Grande, 0.24±0.06. Kansas, 0.333%0.10, did not differ ($>0.05$) from Rio Grande or Marion. Responses for male and female body weights were the same in Marion ($P>0.05$) but response by Kansas males was higher than that for Kansas females ($P<0.05$). There were no significant differences in realized heritabilites for male and female body weights ($P>0.05$). One or more progeny groups from select brood fish had significantly greater growth during the first summer, growth during first winter, growth during second summer, food consumption rate, disease resistance, and/or feeding vigor than progeny from random brood fish. Selection for body weight did not affect the traits: spawning success, egg hatchability, harvestability and dressing percentage. Fecundity was higher ($P<0.05$) for female catfish selected for body weight in the Rio Grande strain but not in the Marion and Kansas strains. Head percentage was higher for processed Rio Grande selects ($P<0.01$) than for their corresponding randoms. There was no difference in processing characteristics between selects and randoms in the other two populations.

82-001294 Engelhardt, T. PRODUCTION OF HYBRID SUNFISH. *Proc. Fish. Farm Conf. Annu. Conf. Fish Farm. Tex.* 1981:46-50. 1981. SFA 27(3)
[Tex. Parks Wildl. Dep., P.O. Box 68, Lewisville 75067]

82-001295 Guerrero, R. D. III. DEVELOPMENT, PROSPECTS AND PROBLEMS OF THE TILAPIA CAGE CULTURE INDUSTRY IN THE PHILIPPINES. *Aquaculture* 27(3):313-315. Apr. 1982. SFA 27(3)
[Coll. Inland Fish., Cent. Luzon State Univ., Nueva Ecija, Philippines]
The Philippines has vast freshwater resources for cage culture of fish. Two tilapia species, *Tilapia mossambica* and *Tilapia nilotica*, are

WARMWATER CULTURE (CONTINUED)

82-001295 CONTINUED cultured commercially in cages in several lakes. Field testing for cage culture of *Tilapia nilotica*, the preferred species, is described. A pilot commercial cage farm has been established. The major problems affecting development are the short supply of quality fingerlings, the lack of a standard commercial feed, and the increasing costs of cage construction. Recommendations for resolving these problems are given.

82-001296 Lock, J. T. PRODUCTION AND USE OF GRASS CARP. *Proc. Fish Farm. Conf. Annu. Conv. Fish Farm. Tex.* 1981:6-29. 1981. SFA 27(3)
[Tex. Agric. Ext. Serv., P.O. Drawer 38, Overton 75684]

82-001297 Rabelahatra, A. IMPROVEMENT OF TECHNIQUES FOR CARP FRY PRODUCTION IN THE LABORATORY. *Aquaculture* 27(3):307-311. Apr. 1982. SFA 27(3)
[Fish-Cult. Res. Div., For. Water Dep., P.O. Box 904, Antananarivo, Madagascar]

82-001298 Rothbard, S. INDUCED REPRODUCTION IN CULTIVATED CYPRINIDS--THE COMMON CARP AND THE GROUP OF CHINESE CARPS: II. THE REARING OF LARVAE AND THE PRIMARY NURSING OF FRY. *Bamidgeh* 34(1):20-32. Mar. 1982. SFA 27(3)
[Fish Aquacult. Res. Stn., Dor, Israel]

82-001299 Tave, D. and R. O. Smitherman. SPAWNING SUCCESS OF RECIPROCAL HYBRID PAIRINGS BETWEEN BLUE AND CHANNEL CATFISHES WITH AND WITHOUT HORMONE INJECTION. *Prog. Fish-Cult.* 44(2):73-74. Apr. 1982. SFA 27(3)
[Dep. Entomol. Fish. Wildl., Univ. Minn., St. Paul 55108]

82-001300 Wass, B. and K. Strawn. EXPERIMENTAL CULTURE OF MUD-MINNOW FOR THE LIVE BAIT INDUSTRY. *Proc. Fish Farm. Conf. Annu. Conv. Fish Farm. Tex.* 1981:88-97. 1981. SFA 27(3)
[Dep. Wildl. Fish Sci., Tex. A&M Univ., College Station 77843]

82-001301 White, B. L. HATCHERY PROPAGATION OF FLORIDA BASS. *Proc. Fish Farm. Conf. Annu. Conv. Fish Farm. Tex.* 1981:39-45. 1981. SFA 27(3)

82-001302 Williamson, J. H. COMPARING TRAINING SUCCESS BETWEEN TWO STRAINS OF LARGEMOUTH BASS. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:53-54. 1981[1982]. Abstract only. SFA 27(3)
[San Marcos Natl. Fish. Hatchery Dev. Cent., Rt. 1, Box 159-D, San Marcos, TX 78666] The study was conducted to determine if performance between two strains of largemouth bass, *Micropterus salmoides*, (Lacepede) was substantially different for an important intensive culture character--training success on formulated feed (Biodiet). During the training period (17-18 days) fingerlings were offered a pelleted diet which they accepted or starved. The San Marcos (Marion) and Inks Dam (northern) LMB strains were trained at San Marcos National Fish Hatchery and Development Center to accept formulated feed under similar conditions--a simulated production environment. One and one quarter inch fingerlings which had been reared using similar conditions were stocked at equal densities (0.20 kg/28.3 l), in triplicate, in indoor rectangular tanks (230.0 l). They received 1.6 mm (1/16 in) semi-moist Biodiet pellets at 15% stocked biomass/day throughout the taining period. Feed was delivered by automatic, clock-type feeders. Following training, survival or training success was calculated for each

WARMWATER CULTURE (CONTINUED)

82-001302 CONTINUED strain. Training success with the ID(n) strain was 23.4% and the success of the SM(M) strain was 43.1%. The SM(M) strain performed 84.2% better than the ID(n) strain under similar conditions. The results provided in this study support the contention that genetic difference between the strains explains to a measureable extent the training success difference between the strains. This data as well as previous experience with both strains suggest significant gains in production and management are possible by exploiting the genetic potential of different strains of largemouth bass.

82-001303 Winfree, R. A. and R. R. Stickney. GROWTH RATES OF CHANNEL CATFISH CULTURED IN CENTRAL TEXAS. *Proc. Fish Farm. Conf. Annu. Conv. Fish Farm. Tex.* 1981:76-87. 1981. SFA 27(3)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843]

MARICULTURE

82-001304 Bwathondi, P. O. J. PRELIMINARY INVESTIGATIONS ON RABBITFISH, *SIGNAUS CANALICULLATUS*, CULTIVATION IN TANZANIA. *Aquaculture* 27(3):205-210. Apr. 1982. SFA 27(3)
[Univ. Dar es Salaam, Inst. Mar. Sci., P.O. Box 668, Zanzibar, Tanzania]

82-001305 Chervinski, J. A NOTE ON THE EFFECTS OF LOW TEMPERATURE ON GOLDEN GREY MULLET *LIZA AURATA* (RISSO) MAINTAINED IN SEA-WATER PONDS. *Bamidgeh* 34(1):33-35. Mar. 1982. SFA 27(3)
[Fish Aquacult. Res. Stn., Dor, Israel]

82-001306 Chua, T. E. and S. K. Teng. EFFECTS OF FOOD RATION ON GROWTH, CONDITION FACTOR, FOOD CONVERSION EFFICIENCY, AND NET YIELD OF ESTUARY GROUPER, *EPINEPHELUS SALMOIDES* MAXWELL, CULTURED IN FLOATING NET-CAGES. *Aquaculture* 27(3):273-283. Apr. 1982. SFA 27(3)
[SEAFDEC Aquacult. Dep., Iloilo, Philippines] The effects of food ration on the growth and yield of the estuary grouper raised in floating net-cages were investigated. The optimum ration given on alternate days was 5% body weight (wet) which gave the best mean fish weight, uniform condition factor with time, relatively good survival rate, and greatest efficiency of food conversion. The maintenance, optimum and maximum food rations were 1.41, 5.75, and 9.0% body weight (wet) respectively. The fish were more uniform in size when fed 5-8% body weight. Though the yields at the end of the experiment were higher with high ration rates, the difference between rations of 5 and 9.1% body weight was 26.8 and 33.6%, whilst that between 5% and 2% body weight was 596%. For economic production, the ration should be approximately 5% of body weight supplied every 2 days.

82-001307 Davies, D. S. MARICULTURE DEVELOPMENT ON LONG ISLAND--LAND AND WATER USE CONSIDERATIONS. *Fisheries (Bull. Am. Fish. Soc.)* 7(2):11-13. Mar.-Apr. 1982. SFA 27(3)
[Long Island Reg. Plan. Bd., Hauppauge, NY]

82-001308 Hem, S. L'AQUACULTURE EN ENCLOS: ADAPTATION AU MILIEU LAGUNAIRE IVOIRIEN. [AQUACULTURE IN ENCLOSURES: ADAPTATION TO THE LAGOON SYSTEM OF THE IVORY COAST.] *Aquaculture* 27(3):261-272. Apr. 1982. In French with

MARICULTURE (CONTINUED)

82-001308 CONTINUED English summ. SFA 27(3)
[Cent. Rech. Oceanogr. ORSTOM, B.P. V18, Abidjan, Ivory Coast]

82-001309 Hoornbeek, F. K.; P. J. Sawyer and E. S. Sawyer. GROWTH OF WINTER FLOUNDER (*PSEUDOPLEURONECTES AMERICANUS*) AND SMOOTH FLOUNDER (*LIOPSETTA PUTNAMI*) IN HEATED AND UNHEATED WATER. *Aquaculture* 28(3-4):363-373. July 1982. SFA 27(3)

[Dep. Zool., Univ. N. H., Durham 03824] O-group and I-group winter (*Pseudopleuronectes americanus*) and smooth (*Liopsetta putnami*) flounder were reared at the Jackson Estuarine Laboratory, Durnam, NH, U.S.A., between November 1975 and June 1976. Both species gained weight approximately three times more rapidly in heated than in unheated water. In unheated water the smallest winter flounder gained, on average, 116% of their body weight per month. Larger O-group winter flounder increased body weight by 55% per month, while comparably sized female and male smooth flounder gained 52% and 28% per month, respectively. I-group female smooth flounder gained 9.5% and male smooth flounder 8.5% per month in heated water. In unheated water increases were 13%, 22%, and 14% per month for O-group winter, female smooth, and male smooth flounder, respectively. I-group winter flounder in unheated water gained weight twice as rapidly (9.5% per month) as I-group female and male smooth flounder (4.0% and 4.5% per month, respectively). Fish were fed a moist diet at a level of 10% of their body weight per day. Conversions (dry weight of food/wet weight of fish) ranged from 1:1 for O-group winter flounder in heated water to 27:1 for I-group smooth flounder in unheated water. Disease was a major cause of mortality. *Vibrio anguillarum* was confirmed as a pathogen; myxobacteria, and the protozoan parasites *Kudoa* sp. and *Nosema* sp. were associated with losses.

FEEDS, FEEDING, AND NUTRITION

82-001310 Anwar, A.; M. M. Ishak; M. El-Zeiny and G. D. I. Hassanen. ACTIVATED SEWAGE SLUDGE AS A REPLACEMENT FOR BRAN-COTTON SEED MEAL MIXTURE FOR CARP, *CYPRINUS CARPIO* L. *Aquaculture* 28(3-4):321-325. July 1982. SFA 27(3)

[Anim. Prod. Dep., Fac. Agric., Ain Shams Univ., Cairo, Egypt] The commonly used cotton seed meal-wheat bran mixture for carp was replaced by activated sewage sludge to the extent of 0, 40, 70 and 100% in order to obtain the best calorie:protein ratio for growth. Duplicate water tanks were used and 46-day-old fish were studied for a period of 45 days during which they were fully fed on the experimental diets. Poor results were obtained when the mixture was completely replaced by activated sewage sludge due to low energy contents. However, partial replacement was favourable, especially at a rate of 40% which resulted in a diet containing about 56 gross protein value units and 2310 kcal ME/kg.

82-001311 Carrillo, M.; S. Zanuy and E. Herrera. GROWTH AND DIURNAL VARIATIONS IN METABOLIC PARAMETERS IN THE STARVED BASS, *DICENTRARCHUS LABRAX*, AFTER EXPERIMENTAL FEEDING. *Comp. Biochem. Physiol. A Comp. Physiol.* 72(1):11-16. 1982. SFA 27(3)

[Inst. Invest. Pesq., Torre La Sal, Castellón, Spain]

FEEDS, FEEDING, AND NUTRITION (CONTINUED)

82-001312 Dabrowski, K. R. FURTHER STUDY ON DRY DIET FORMULATION FOR COMMON CARP LARVAE. *Riv. It. Piscic. Ittiop.* 17(1):11-29. Jan.-Feb.-Mar. 1982. In English and Italian. SFA 27(3)
[Inst. Ichthyobiol. Fish., Acad. Agric. Technol., 10-957 Olsytyn-Kortowo, Poland]

82-001313 Eckhardt, O.; K. Becker; K.-D. Günther and C. Meske. ZUM PROTEIN- UND ENERGIEBEDARF WACHSENDER SPIEGELKARPFEN (*CYPRINUS CARPIO* L.). II. EINFLUß VON FETTZULAGEN BEI UNTERSCHIEDLICHEN PROTEIN- UND KOHLENHYDRATGEHALTEN DER RATION AUF WACHSTUM UND KÖRPERZUSAMMENSETZUNG. [ON THE PROTEIN AND ENERGY REQUIREMENT OF GROWING CARP (*CYPRINUS CARPIO* L.) II. EFFECT OF ADDITIONAL FAT AT VARIOUS PROTEIN AND CARBOHYDRATE CONTENTS OF RATION ON GROWTH AND BODY COMPOSITION.] *J. Anim. Physiol. Anim. Nutr.* 47(4):186-196. 1982. In German with English summ. SFA 27(3)
[Inst. Tierphysiol. Tierernährung Univ. Gottingen, Oskar-Kellner-Weg 6,3400 Gottingen, West Germany]

82-001314 Ezenwa, B. PRODUCTION OF CATFISH, *CHRYSICHTHYS NIGRODIGITATUS*, IN BRACKISH WATER PONDS IN NIGERIA USING GROUNDNUT CAKE AS SUPPLEMENTAL FEED. *Aquaculture* 27(3):197-203. Apr. 1982. SFA 27(3)
[Nigerian Inst. Oceanogr. Mar. Res., P.M.B. 12729, Victoria Island, Lagos, Nigeria]

82-001315 Hashimoto, S. [STUDIES ON THE METABOLIC FUNCTIONS OF YOUNG CHUM SALMON, *ONCORHYNCHUS KETA* (WALBAUM) - III. EFFECT OF DELETION OF VITAMIN C AND K FROM AND ADDITION OF WATER TO MANUFACTURED DIET.] *Sci. Rep. Hokkaido Salmon Hatchery* No. 36. p. 39-47. Mar. 1982. SFA 27(3)
[Hokkaido Salmon Hatchery, Nakanoshima, Toyohiraku, Sapporo, Hokkaido, Japan]

82-001316 Hashimoto, S. [RESEARCH ON CULTURE OF CHUM FINGERLINGS FOR STOCKING - II. CONSISTENCY OF DIET, FEEDING SKILL, FREQUENCE, TIME, AND INSUFFICENT WATER FLOW.] *Sci. Rep. Hokkaido Salmon Hatchery* No. 36. p. 19-37. Mar. 1982. In Japanese with English summ. SFA 27(3)
[Hokkaido Salmon Hatchery, Nakanoshima, Toyohiraku, Sapporo, Hokkaido, Japan]

82-001317 Jobling, M. SOME OBSERVATIONS ON THE EFFECTS OF FEEDING FREQUENCY ON THE FOOD INTAKE AND GROWTH OF PLAICE, *PLEURONECTES PLATESSA* L. *J. Fish Biol.* 20(4):431-444. Apr. 1982. SFA 27(3)
[Inst. Fiskerifag, Univ. Tromsø, 9001 Tromsø, Norway] The segregation of plaice, *Pleuronectes platessa*, into groups of uniform size can be used to reduce the formation of size hierarchies, even under conditions of limited food supply. When access to food was limited the fish responded by becoming hyperphagic. This resulted in an increase in growth rate following an initial check. However, even after hyperphagic adaptation, intermittently fed fish grew at slower rates than those allowed more frequent access to food. Hyperphagia was accompanied by an increase in relative stomach weight and gastric capacity but did not affect fat storage and proximate chemical composition.

FEEDS, FEEDING, AND NUTRITION (CONTINUED)

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82-001447 CONTINUED cutaneous respiration. Gulping of air into the extensively vascular oesophagus probably also acts as a means of aerial respiration. Reimmersion of fish caused a transient bradycardia followed by a tachycardia and a fall in $\dot{Q}_{O_2}$ followed subsequently by a rise. The results are discussed in relation to the behavioural, circulatory, respiratory and morphological adaptations of the shany to the intertidal habitat.

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[Dep. Zool., Univ. British Columbia, 6270 University Blvd., Vancouver, BC V6T 2A9, Canada]

82-001502 Soivio, A.; S. Pesonen; T. Teräväinen; T. Nakari and R. Mwenesi. SEASONAL VARIATIONS IN OESTROGEN AND TESTOSTERONE LEVELS IN THE PLASMA OF BROWN TROUT (*SALMO TRUTTA LACUSTRIS*) AND IN THE METABOLISM OF TESTOSTERONE IN ITS SKIN. *Ann. Zool. Fenn.* 19(1):53-59. 1982. SFA 27(3)
[Div. Physiol., Dep. Zool., Univ. Helsinki, Arkadiankatu 7, SF-00100 Helsinki 10, Finland]

82-001503 Sonski, A. J. HEAT TOLERANCE OF BROOK TROUT. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:8-16. 1981[1982]. SFA 27(3)
[Tex. Parks Wildl. Dep., Ingram 78025] Laboratory testing determined the ultimate upper lethal temperature ($LT_{50}$) for brook trout, *Salvelinus fontinalis*. In two replicate trails, trout ($\bar{x}$ TL = 18.6 cm) acclimated at 18 C and 23 C were exposed to temperature increases of 0.5 C/day until death. Lethal temperatures were significantly different (OC = 0.05) between acclimation temperatures. Temperatures at death ranged from 23.3 C to 26.6 C. The $LT_{50}$ for fish acclimated at 18 C and 23 C was 25.3 and 25.1 C, respectively. There was a 90.4% mortality of 23 C control fish; no mortality occurred in the 18 C control.

82-001504 Sower, S. A. and C. B. Schreck. IN VITRO INDUCTION OF FINAL MATURATION OF OOCYTES FROM COHO SALMON. *Trans. Am. Fish. Soc.* 111(3):399-403. May 1982. SFA 27(3)
[Dep. Zool., Univ. Wash., Seattle 98195]

PHYSIOLOGY (CONTINUED)

82-001505 Sower, S. A. and C. B. Schreck. STEROID AND THYROID HORMONES DURING SEXUAL MATURATION OF COHO SALMON (*ONCORHYNCHUS KISUTCH*) IN SEAWATER OR FRESH WATER. *Gen. Comp. Endocrinol.* 47(1):42-53. May 1982. SFA 27(3)
[Dep. Zool., NJ-15, Univ. Wash., Seattle 98195]

82-001506 Stevens, E. D. THE EFFECT OF TEMPERATURE ON FACILITATED OXYGEN DIFFUSION AND ITS RELATION TO WARM TUNA MUSCLE. *Can. J. Zool.* 60(5):1148-1152. May 1982. In English with French summ. SFA 27(3)
[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

82-001507 Tabata, M. THE SOURCE CELL OF THE PINEAL MASS POTENTIAL, ELECTROPINEALOGRAM (EPG), OF RAINBOW TROUT. *Bull. Jpn. Soc. Sci. Fish.* 48(3):477. Mar. 1982. SFA 27(3)
[First Dep. Physiol., Hamamatsu Univ. Sch. Med., Handa, Hamamatsu 431-31, Japan]

82-001508 Tabata, M. THE ELECTROPINEALOGRAM (EPG) IN TELEOSTS. *Bull. Jpn. Soc. Sci. Fish.* 48(2):151-155. Feb. 1982. SFA 27(3)
[1st Dep. Physiol., Hamamatsu Univ. Sch. Med., 3600, Handa, Hamamatsu 431-31, Japan]

82-001509 Takeda, H. and C. Shimizu. PURIFICATION OF METALLOTHIONEIN FROM THE LIVER OF SKIPJACK AND ITS PROPERTIES. *Bull. Jpn. Soc. Sci. Fish.* 48(5):717-723. May 1982. SFA 27(3)
[Fac. Agric., Miyazaki Univ., Funatsuka-3, Miyazaki 880, Japan]

82-001510 Takeda, H. and C. Shimizu. EXISTENCE OF THE METALLOTHINONEIN-LIKE PROTEIN IN VARIOUS FISH TISSUES. *Bull. Jpn. Soc. Sci. Fish.* 48(5):711-715. May 1982. SFA 27(3)
[Fac. Agric., Miyazaki Univ., Funatsuka-3, Miyazaki 880, Japan]

82-001511 Tomasso, J. R.; B. A. Simco and K. B. Davis. CIRCULATING CORTICOSTEROID AND LEUCOCYTE DYNAMICS IN CHANNEL CATFISH DURING NET CONFINEMENT. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:67. 1981[1982]. Abstract only. SFA 27(3)
[Southwest Tex. State Univ., San Marcos] Plasma corticosteroid concentratons of channel catfish increased significantly in response to a 24 h net confinement. Leucocrits of net confined fish decreased after 6 h of confinement. Blood cell differential counts indicated that, during the stress, lymphocyte counts decreased by 6 h of confinement and granulocyte counts increased by 12 h of confinement. The decrease in leucocrit at 6 h was attributed to the decrease in lymphocyte number and the increase of leucocrit at 12 h was attributed to the increase in granulocyte number.

82-001512 Tuurala, H.; A. Soivio and M. Nikinmaa. THE EFFECTS OF ADRENALINE ON HEART RATE AND BLOOD PRESSURE IN *SALMO GAIRDNERI* AT TWO TEMPERATURES. *Ann. Zool. Fenn.* 19(1):47-51. 1982. SFA 27(3)
[Div. Physiol., Dep. Zool., Univ. Helsinki, Arkadiankatu 7, SF-00100 Helsinki 10, Finland]

PHYSIOLOGY (CONTINUED)

82-001513 van den Thillart, G.; A. van Waarde; F. Dobbe and F. Kesbeke. ANAEROBIC ENERGY METABOLISM OF GOLDFISH, *CARASSIUS AURATUS* (L.). EFFECTS OF ANOXIA ON THE MEASURED AND CALCULATED $NAD^+$/NADH RATIOS IN MUSCLE AND LIVER. *J. Comp. Physiol. B Biochem. Syst. Environ. Physiol.* 146(1):41-49. 11 Mar. 1982. SFA 27(3)
[Gorlaeus Lab., Dep. Anim. Physiol., State Univ. Leiden, Wassenaarseweg 76, 2300-RA Leiden, Netherlands]

82-001514 van Waarde, A. and F. Kesbeke. NITROGEN METABOLISM IN GOLDFISH, *CARASSIUS AURATUS* (L.) ACTIVITIES OF AMIDASES AND AMIDE SYNTHETASES IN GOLDFISH TISSUES. *Comp. Biochem. Physiol. B Comp. Biochem.* 71(4):599-603. 1982. SFA 27(3)
[Zool. Lab., Dep. Cell Biol. Morphogen., State Univ. Leiden, P.O. Box 9516, 2300 Ra Leiden, Netherlands]

82-001515 Van Waarde, A.; M. De Wilde-Van Berge Henegouwen. NITROGEN METABOLISM IN GOLDFISH, *CARASSIUS AURATUS* (L.). PATHWAY OF AEROBIC AND ANAEROBIC GLUTAMATE OXIDATION IN GOLDFISH LIVER AND MUSCLE MITOCHONDRIA. *Comp. Biochem. Physiol. B Comp. Biochem.* 72(1):133-136. 1982. SFA 27(3)
[Dep. Cell. Biol. Morphogen., Zool. Lab., State Univ. Leiden, Wassenaarseweg 72, Leiden, Netherlands]

82-001516 Vetter, R. D. and R. E. Hodson. USE OF ADENYLATE CONCENTRATIONS AND ADENYLATE ENERGY CHARGE AS INDICATORS OF HYPOXIC STRESS IN ESTUARINE FISH. *Can. J. Fish. Aquatic Sci.* 39(4):535-541. Apr. 1982. In English with French summ. SFA 27(3)
[Dep. Microbiol., Univ. Ga., Athens 30602]

82-001517 Wallén, P. SPINAL MECHANISMS CONTROLLING LOCOMOTION IN DOGFISH AND LAMPREY. *Acta Physiol. Scand. Suppl.* 503. 45p. 1982. SFA 27(3)
[Dep. Physiol. III, Karolinska Inst., Stockholm, Sweden]

82-001518 Weatherley, A. H.; S. C. Rogers; D. G. Pincock and J. R. Patch. OXYGEN CONSUMPTION OF ACTIVE RAINBOW TROUT, *SALMO GAIRDNERI* RICHARDSON, DERIVED FROM ELECTROMYOGRAMS OBTAINED BY RADIOTELEMETRY. *J. Fish Biol.* 20(4):479-489. Apr. 1982. SFA 27(3)
[Life Sci. Div., Scarborough Coll., Univ. Toronto, West Hill, ON M1C 1A4, Canada]

82-001519 Weisberg, S. B. and V. A. Lotrich. INGESTION, EGESTION, EXCRETION, GROWTH, AND CONVERSION EFFICIENCY FOR THE MUMMICHOG, *FUNDULUS HETEROCLITUS* (L.). *J. Exp. Mar. Biol. Ecol.* 62(3):237-249. 1 July 1982. SFA 27(3)
[Environ. Cent., Martin Marietta Crop., 1450 S. Rolling Rd., Baltimore, MD 21227] The food conversion efficiency of *Fundulus heteroclitus* (L.) was measured in terms of calories and nitrogen for three diets: *Palaemonetes* sp., *Nereis* sp., and *Uca pugnax*. Fish were allowed to feed ad libitum for 30-60 min each day. Growth, ingestion, egestion, and excretion were measured for fish fed each diet. The growth rates of *Fundulus heteroclitus* fed two of the single item diets of invertebrates were higher than growth rates previously estimated for mimmichogs from the natural population in Canary Creek marsh. In comparison with other fish species, *F. heteroclitus* was found to have higher than average assimilation efficiency ($\bar{X}$ = 87% for all three diets) and a lower than average

PHYSIOLOGY (CONTINUED)

82-001519 CONTINUED gross growth efficiency (~ 12% for two of the diets). Metabolic costs accounted for an average of 69% of ingested energy. Excretion rates were also large, with excretion accounting for more energy than egestion in two of the three diets.

82-001520 Witthames, P. R. and M. G. Walker. THE ACTIVITY OF MYOFIBRILLAR AND ACTOMYOSIN ATPASE IN THE SKELETAL MUSCLE OF SOME MARINE TELEOSTS IN RELATION TO THEIR LENGTH AND AGE. *J. Fish Biol.* 20(4):471-478. Apr. 1982.. SFA 27(3)
[Minist. Agric. Fish. Food, Dir. Fish. Res., Fish. Lab., Lowestoft, Suffolk NR33 0HT, England]

82-001521 Young, G.; H. Kagawa and Y. Nagahama. INHIBITORY EFFECT OF CYANOKETONE ON SALMON GONADOTROPIN-INDUCED ESTRADIOL-17β PRODUCTION BY OVARIAN FOLLICLES OF THE AMAGO SALMON (*ONCORHYNCHUS RHODURUS*) *IN VITRO*. *Gen. Comp. Endocrinol.* 47(3):357-360. July 1982. SFA 27(3)
[Lab. Reprod. Biol., Natl. Inst. Basic Biol., Okazaki 444, Japan]

82-001522 Zaccone, G. and A. Licata. HISTOENZYMORPHOLOGY AND FINE STRUCTURE OF THE IONOCYTES IN THE HEAD EPIDERMIS OF A MARINE TELEOST *XYRICHTHYS NOVACULA* L. (LABRIDAE, PISCES). *Arch. Biol. Morphol. Exp. Comp.* 92(4):451-465. 1982. SFA 27(3)
[Inst. Zool. Comp. Anat., Messina Univ., Italy]

GENETICS, VARIATION STUDIES AND HYBRIDIZATION

82-001523 Buth, D. G. and C. B. Crabtree. GENETIC VARIABILITY AND POPULATION STRUCTURE OF *CATOSTOMUS SANTAANAE* IN THE SANTA CLARA DRAINAGE. *Copeia* 1982(2):439-444. 28 May 1982. SFA 27(3)
[Dep. Biol., Univ. Calif., Los Angeles 90024]

82-001524 Clark, B. and P. Mathis. KARYOTYPES OF MIDDLE TENNESSEE BULLHEADS: *ICTALURUS MELAS* AND *ICTALURUS NATALIS* (CYPRINIFORMES: ICTALURIDAE). *Copeia* 1982(2):457-460. 28 May 1982. SFA 27(3)
[Dep. Biol., Univ. South Fla., Tampa 33620]

82-001525 Davis, B. and C. Olito. GENETIC VARIATION IN ALASKAN CHUM SALMON, *ONCHORHYNCHUS KETA*. *Alaska Dep. Fish Game Inf. Leaf.* No. 200. ii + 14p. Apr. 1982. SFA 27(3)
[Alaska Dep. Fish Game, Div. Fish. Rehabilitation Enhancement Dev., Anchorage 99502]

82-001526 FAO of the UN. CONSERVATION OF THE GENETIC RESOURCES OF FISH: PROBLEMS AND RECOMMENDATIONS. *FAO Fish. Tech. Pap.* No. 217. viii + 43p. 1981. SFA 27(3)
[Rome, Italy]

GENETICS, VARIATION STUDIES AND HYBRIDIZATION (CONTINUED)

82-001527 Ferris, S. D.; D. G. Buth and G. S. Whitt. SUBSTANTIAL GENETIC DIFFERENTIATION AMONG POPULATIONS OF *CATOSTOMUS PLEBEIUS*. *Copeia* 1982(2):444-449. 28 May 1982. SFA 27(3)
[Dep. Genet. S-337, Stanford Univ. Sch. Med., Stanford, CA 94305]

82-001528 Fisher, P. W.; D. Browne; D. G. Cameron and E. R. Vyse. GENETICS OF RAINBOW TROUT IN A GEOTHERMALLY HEATED STREAM. *Trans. Am. Fish. Soc.* 111(3):312-316. May 1982. SFA 27(3)
[Dep. Genet., Univ. Calif., Davis 95616]

82-001529 Garcia Pinto, L. HYBRIDIZATION BETWEEN SPECIES OF *TILAPIA*. *Trans. Am. Fish. Soc.* 111(4):481-484. July 1982. SFA 27(3)
[Cent. Invest. Biol., Univ. Zulia, P.O. B. 526, Maracaibo, Venezuela]

82-001530 Hagen, D. W. and G. E. E. Moodie. POLYMORPHISM FOR PLATE MORPHS IN *GASTEROSTEUS ACULEATUS* ON THE EAST COAST OF CANADA AND AN HYPOTHESIS FOR THEIR GLOBAL DISTRIBUTION. *Can. J. Zool.* 60(5):1032-1042. May 1982. In English with French summ. SFA 27(3)
[Dep. Biol., Univ. New Brunswick, Fredericton, NB E3B 6E1, Canada]

82-001531 Harvey, W. D. and R. L. Noble. SOME IMPLICATIONS OF BASS GENETICS STUDIES ON THE ISSUE OF CERTIFICATION OF FISH SPECIES. *Proc. Fish Farm. Conf. Annu. Conv. Fish Farm. Tex.* 1981:51-61. 1981. SFA 27(3)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843]

82-001532 Harvey, W. D.; R. L. Noble and W. H. Neill. A BIOPSY TECHNIQUE FOR GENETIC EVALUATION OF LARGEMOUTH BASS. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:34. 1981[1982]. Abstract only. SFA 27(3)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station] Fifty-four brood size (greater than 250 mm) largemouth bass were live biopsied for removal of liver tissue to be used in electrophoretic evaluation of individual genetic status. These fish were subsequently stocked into six brood ponds for production of known intrasubspecific and intersubspecific genetic crosses. Spawning occurred in each pond indicating minimal effect of biopsy on spawning physiology. Forty-four fish were removed from the ponds at the termination of the experiment. All incisions were completely healed and condition of fish had improved over condition at time of stocking.

82-001533 Hunter, G. A.; E. M. Donaldson; F. W. Goetz and P. R. Edgell. PRODUCTION OF ALL-FEMALE AND STERILE COHO SALMON, AND EXPERIMENTAL EVIDENCE FOR MALE HETEROGAMETY. *Trans. Am. Fish. Soc.* 111(3):367-372. May 1982. SFA 27(3)
[Dep. Fish. Oceans, 4160 Marine Dr., West Vancouver, BC V7V 1N6, Canada]

82-001534 Joswiak, G. R.; R. H. Stasiak and W. S. Moore. ALLOZYME ANALYSIS OF THE HYBRID *PHOXINUS EOS* X *PHOXINUS NEOGAEUS* (PISCES: CYPRINIDAE) IN NEBRASKA. *Can. J. Zool.* 60(5):968-973. May 1982. In English with French summ. SFA 27(3)
[Dep. Biol. Sci., Wayne State Univ., Detroit, MI 48202]

GENETICS, VARIATION STUDIES AND HYBRIDIZATION (CONTINUED)

82-001535 Loginova, G. A. and S. V. Krasnoperova. AN ATTEMPT AT CROSSBREEDING ATLANTIC SALMON AND PINK SALMON (PRELIMINARY REPORT). *Aquaculture* 27(4):329-337. May 1982. SFA 27(3)

[PINRO, Murmansk, USSR] The results of artificial crossbreeding of *Salmo salar* and *Oncorhynchus gorbuscha* of the Kola river (Murmansk region) are discussed. Observations are presented on developmental characteristics of the hybrid and the Atlantic salmon parent, as well as karyological data on hybrid and control embryos. Crosses of Atlantic salmon and pink salmon of the Kola river produced non-viable embryos with various morphological anomalies. The diploid chromotype of the hybrid ranged from 52 to 56. The number of two-armed chromosomes in the karyotype of the hybrid embryos was greater than that in the karyotype of Atlantic salmon. It is concluded that crosses of Atlantic salmon and pink salmon could not occur in nature.

82-001536 Lyons, B. W. SURVIVAL RATES OF THREE SUNFISH X LARGEMOUTH BASS HYBRIDS. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:4. 1981[1982]. Abstract only. SFA 27(3)

[Tex. Parks Wildl. Dep., Ingram 78025] Male redbreast sunfish (*Lepomis auritus*), redear sunfish (*L. microlophus*) and coppernose bluegill (*L. macrochirus purpurescens*) were crossed with largemouth bass (*Micropterus salmoides*). These sunfish were selected for their adult size. All crosses were artificially produced by hand-stripping the sex products into petri dishes. Survival to 60-mm fingerlings ranged from 0.00 to 3.13%. Many of the resulting hybrids were deformed. Based on low survival rates, none of the hybrids studied appear to be feasible for hatchery production.

82-001537 McGlade, J. M. GENOTYPIC AND PHENOTYPIC VARIATION IN THE BROOK TROUT, *SALVELINUS FONTINALIS* (MITCHILL). *Ph.D. dissertation, Univ. Guelph* 1982. From Diss. Abstr. Int. B Sci. Eng. 42(12):4708. June 1982. SFA 27(3)

82-001538 Moyer, J. T. INTERSPECIFIC SPAWNING OF THE PYGMY ANGELFISHES *CENTROPYGE SHEPARDI* AND *CENTROPYGE BISPINOSUS* AT GUAM. *Micronesica* 17(1-2):119-124. Dec. 1981. SFA 27(3)

[Tatsuo Tanaka Mem. Biol. Stn., Ako Miyake-jima, Izu Islands, Japan 100-12]

82-001539 Ojima, Y. and E. Kashiwagi. CHROMOSOMAL EVOLUTION ASSOCIATED WITH ROBERTSONIAN FUSION IN THE GENUS *DASCYLLUS* (CHROMINAE, PISCES). *Proc. Jpn. Acad. Ser. B Phys. Biol. Sci.* 57(10):368-370. Dec. 1981. SFA 27(3)

[Dep. Biol., Fac. Sci., Kwanwei Gakuin Univ., Nishinomiya, Japan]

82-001540 Phelps, S. R. and F. W. Allendorf. GENETIC COMPARISON OF UPPER MISSOURI CUTTHROAT TROUT TO OTHER *SALMO CLARKI LEWISI* POPULATIONS. *Proc. Mont. Acad. Sci.* 41:14-22. 1982. SFA 27(3)

[Dep. Zool., Univ. Mont., Missoula 59812] Cutthroat trout from the Helena and the Lewis and Clark National Forests in the upper Missouri drainage are not genetically different from *S. c. lewisi* populations west of the Continental Divide. There is no indication that any taxonomic distinction should be made between upper Missouri cutthroat trout and other westslope cutthroat trout. The cutthroat trout (*S. c. lewisi*) on opposite sides of the Continental Divide in Montana are more similar to each other than either of them is to cutthroat trout (*S. c. lewisi*) populations in the South Saskatchewan River drainage. The amount of genetic variation in the upper Missouri cutthroat trout is low; average heterozygosity is only 0.001.

GENETICS, VARIATION STUDIES AND HYBRIDIZATION (CONTINUED)

82-001541 Seeb, J. and L. Wishard. BIOCHEMICAL GENETIC ANALYSIS OF TWO STRAINS OF NEBRASKA RAINBOW TROUT. *Nebr. Game Parks Comm. Tech. Ser.* No. 7. p. 29-34. 1979. SFA 27(3)

This report genetically characterized the domestic and McConaughy strains of rainbow trout using the biochemical genetics and the technique of electrophoresis. The domestic and McConaughy strains have been shown to be genetically distinct. Not only are the allele frequencies different at 4 loci, but the domestic strain was overall more polymorphic than the McConaughy strain. The frequencies associated with the strains would remain constant through time, assuming no outside manipulation or drastic reduction in population numbers occurred. Thus the differences identified in this paper should provide useful management tools to identify, separate, and follow the progress of the McConaughy and domestic strains in Nebraska.--Concl.

82-001542 Shelton, W. L. PRODUCTION OF REPRODUCTIVELY LIMITED GRASS CARP FOR BIOLOGICAL CONTROL OF AQUATIC WEEDS--PHASE II. *Auburn Univ. Water Resour. Res. Inst. WRRI Bull.* 45. ix + 64p. Jan. 1982. SFA 27(3)

[Water Resour. Res. Inst., Auburn Univ., AL] Infestation of waterways with nuisance aquatic plants is a world-wide problem and the desirability of an effective biological control is increasingly evident considering the cost-effectiveness and environmental concerns associated with chemical means. The grass carp feeds on a wide variety of aquatic plants but opposition to the use of this exotic fish is largely on the basis of potential naturalization; control of unwanted reproduction would increase the acceptance of grass carp in the U.S. Monosexing through hormone sex reversal has been used in aquaculture as a means of preventing reproduction and was selected as the most practicable approach for grass carp. However, their specialized feeding habits complicated convential oral treatment, so an alternative method of steroid exposure was required. Functional sex reversal was used as a means of developing broodstock that, when bred would yield monosex progeny. Sex-reversed males (genotypic females) were bred in 1980 and 1981; of the approximately 500 offspring from the 1980 year class that have been sexed, all were females. Further, all gynogenetic grass carp that have been sexed have been females. Additional evaulation of the 1980 year class and sexing fish from the 1981 year class will be done. If these offspring are also only female, the program of monosexing by breeding can be considered practical application.

82-001543 Ståhl, G. and N. Ryman. SIMPLE MENDELIAN INHERITANCE AT A LOCUS CODING FOR α-GLYCEROPHOSPHATE DEHYDROGENASE IN BROWN TROUT (*SALMO TRUTTA*). *Hereditas* 96(2):313-315. 1982. SFA 27(3)

[Dep. Genet., Univ. Stockholm, Box 6801, S-113 86 Stockholm, Sweden]

82-001544 Sumantadinata, K. and N. Taniguchi. BIOCHEMICAL GENETIC VARIATIONS IN BLACK SEABREAM. *Bull. Jpn. Soc. Sci. Fish.* 48(2):143-149. Feb. 1982. SFA 27(3)

[Dep. Cult. Fish., Fac. Agric., Kochi Univ., Nankoku, Kochi 783, Japan]

82-001545 Taniguchi, N.; K. Sumantadinata; A. Suzuki and J. Yamada. GENETIC VARIATIONS IN ISOELECTRIC FOCUSING PATTERN OF SARCOPLASMIC PROTEIN OF BLACK SEABREAM. *Bull. Jpn. Soc. Sci. Fish.* 48(2):139-141. Feb. 1982. SFA 27(3)

[Dep. Cult. Fish., Fac. Agric., Kochi Univ., Nankoku, Kochi 783, Japan]

GENETICS, VARIATION STUDIES AND HYBRIDIZATION (CONTINUED)

82-001546 Yabu, H. and K. Ishii. NUCLEAR DIVISIONS IN PACIFIC POMFRET *BRAMA JAPONICA* HILGENDORF. *Bull. Jpn. Soc. Sci. Fish.* 48(4):505-507. Apr. 1982. SFA 27(3)
[Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

BEHAVIOR

82-001547 Able, K. W.; C. B. Grimes; R. A. Cooper and J. R. Uzmann. BURROW CONSTRUCTION AND BEHAVIOR OF TILEFISH, *LOPHOLATILUS CHAMAELEONTICEPS*, IN HUDSON SUBMARINE CANYON. *Environ. Biol. Fishes* 7(3):199-205. 1 June 1982. SFA 27(3)
[Dep. Zool., Rutgers Univ., New Brunswick, NJ]

82-001548 Baylis, J. R. UNUSUAL EXCAPE RESPONSE BY TWO CYPRINODONTIFORM FISHES, AND A BLUEGILL PREDATOR'S COUNTER-STRATEGY. *Copeia* 1982(2):455-457. 28 May 1982. SFA 27(3)
[Dep. Zool., Univ. Wis., Madison 53706]

82-001549 Blumer, L. S. A BIBLIOGRAPHY AND CATEGORIZATION OF BONY FISHES EXHIBITING PARENTAL CARE. *Zool. J. Linn. Soc.* 75(1):1-22. May 1982. SFA 27(3)
[Div. Biol. Sci., Univ. Mich., Ann Arbor 48109] Parental care occurs in a diversity of fishes, but predominantly among freshwater groups. Among the approximately 422 families of bony fishes (Osteichthyes), 89 are presently known to exhibit parental care. Grouping these families into eight categories, based on the sex of the care-giver(s), reveals male parental care is as common or more common than female parental care. Although unusual among vertebrates, parental care by males alone is very common among bony fishes. Lists of families, the forms of parental care exhibited, the modes of fertilization, the environments in which reproduction occurs, and the sources of documentation are presented. An extensive bibliography and index are provided.

82-001550 Bradstreet, M. S. W. OCCURRENCE, HABITAT USE, AND BEHAVIOR OF SEABIRDS, MARINE MAMMALS, AND ARCTIC COD AT THE POND INLET ICE EDGE. *Arctic* 35(1):28-40. Mar. 1982. SFA 27(3)
[LGL Ltd., 44 Eglinton Ave. West, Toronto, ON M4R 1A1, Canada]

82-001551 Carey, F. G.; J. W. Kanwisher; O. Brazier; G. Gabrielson; J. G. Casey and H. L. Pratt, Jr. TEMPERATURE AND ACTIVITIES OF A WHITE SHARK, *CARCHARODON CARCHARIAS*. *Copeia* 1982(2):254-260. 28 May 1982. SFA 27(3)
[Woods Hole Oceanogr. Inst., Woods Hole, MA 02543] A large (4.6 m) white shark was followed for 3.5 days while its depth, water temperature and muscle temperature were recorded by acoustic telemetry. During this time the shark moved 190 km from an area south of Montauk Point, New York to Hudson Canyon. It made a number of brief excursions to the surface and to the bottom, but usually swam in the thermocline. Muscle temperature of the shark was as much as 5C warmer than the water, confirming that a system of large retia mirabilia in the circulatory system function as heat exchangers. The shark did not thermoregulate and muscle temperature changed slowly as water temperature changed. The warming of the muscle as the shark swam into warmer water allowed us to estimate its rate of metabolism. The rate obtained is low and despite being warm, it appears that the shark can maintain itself for

BEHAVIOR (CONTINUED)

82-001551 CONTINUED more than a month on a single large meal. The implications of this for its feeding habits are discussed.

82-001552 Clarke, L. A. MIGRATION AND ORIENTATION OF TWO STOCKS OF ATLANTIC SALMON (*SALMO SALAR* L.) SMOLTS. *Ph.D. dissertation, Univ. New Brunswick* 1981. From Diss. Abstr. Int. B Sci. Eng. 42(11):4276. May 1982. SFA 27(3)

82-001553 Coombs, S. and A. N. Popper. STRUCTURE AND FUNCTION OF THE AUDITORY SYSTEM IN THE CLOWN KNIFEFISH, *NOTOPTERUS CHITALA*. *J. Exp. Biol.* 97:225-239. Apr. 1982. SFA 27(3)
[Parmly Hearing Inst., Loyola Univ. Chicago, 6525 N. Sheridan Rd., Chicago, IL 60626]

82-001554 Downer, P. SCHOOLING BEHAVIOR OF YOUNG-OF-THE-YEAR TUI CHUB, *GILA BICOLOR* (GIRARD). *M.S. thesis, Univ. Nev. (Reno)* 138p. 1981. From Masters Abstr. 20(2):236. June 1982. SFA 27(3)
Schooling behavior of young-of-the-year tui chub, *Gila bicolor* (Girard), was investigated by photographing schools of 3, 5, 10 and 25 fish before and during feeding and interaction with a predator, a Lahontan cutthroat trout (*Salmo clarki henshawi*). Eight parameters quantifying the degree of compactness and/or degree of polorization of the schools were calculated for each photograph. An auxiliary study suggested that schooled fish show a slower and more variable growth rate than solitary fish.

82-001555 Dubin, R. E. and J. D. Baker. TWO TYPES OF COVER-SEEKING BEHAVIOR AT SUNSET BY THE PRINCESS PARROTFISH, *SCARUS TAENIOPTERUS*, AT BARBADOS, WEST INDIES. *Bull. Mar. Sci.* 32(2):572-583. Apr. 1982. SFA 27(3)
[Dep. Zool., Univ. Alberta, Edmonton, AB T6G 2E9, Canada]

82-001556 Eastman, J. T. and A. L. DeVries. BUOYANCY STUDIES OF NOTOTHENIOID FISHES IN MCMURDO SOUND, ANTARCTICA. *Copeia* 1982(2):385-393. 28 May 1982. SFA 27(3)
[Dep. Zool., Ohio Univ., Athens 45701]

82-001557 Eaton, R. C.; W. A. Lavender and C. M. Wieland. ALTERNATIVE NEURAL PATHWAYS INITIATE FAST-START RESPONSES FOLLOWING LESIONS OF THE MAUTHNER NEURON IN GOLDFISH. *J. Comp. Physiol. A Sens. Neural Behav. Physiol.* 145(4):485-496. 1 Mar. 1982. SFA 27(3)
[Behav. Biol. Group, Dep. Biol., E.P.O., Univ. Colo., Boulder 80309]

82-001558 Fay, R. R. NEURAL MECHANISMS OF AN AUDITORY TEMPORAL DISCRIMINATION BY THE GOLDFISH. *J. Comp. Physiol. A Sens. Neural Behav. Physiol.* 147(2):201-216. July 1982. SFA 27(3)
[Parmly Hearing Inst., Loyola Univ. Chicago, 6525 N. Sheridan Rd., Chicago, IL 60626]

BEHAVIOR (CONTINUED)

82-001559 Fontaine, M.; S. Jeanjean and A. Momzikoff. INTERVENTION POSSIBLE DE LA RIBOFLAVINE (VITAMINE $B_2$) COMME TÉLÉMÉDIATEUR CHIMIQUE DANS LES ÉCOSYSTÈMES AQUATIQUES. [POSSIBLE ACTION OF RIBOFLAVIN (VITAMIN $B_2$) AS A CHEMICAL TELEMEDIATOR IN AQUATIC ECOSYSTEMS.] *C.R. Hebd. Seances Acad. Sci. Ser. III Sci. Vie* 294(3):165-167. 18 Jan. 1982. In French with English summ. SFA 27(3)
[Lab. Physiol., Inst. Oceanogr., 195 rue Saint-Jacques, 75005 Paris, France] The attractive action of riboflavin at certain concentrations on the young Salmon (parr) has been demonstrated. This property diminishes or disappears with smoltifications. Owing to the emission of riboflavin by the young Salmon, the possibility, at diverse migratory or sedentary phases of the biological cycle, of an action of a pheromone or ecomone type, is discussed.

82-001560 Gascon, D. and R. A. Miller. SPACE UTILIZATION IN A COMMUNITY OF TEMPERATE REEF FISHES INHABITING SMALL EXPERIMENTAL ARTIFICIAL REEFS. *Can. J. Zool.* 60(5):798-806. May 1982. In English with French summ. SFA 27(3)
[Dep. Zool., Univ. Alberta, Edmonton, AB T6G 2E9, Canada]

82-001561 Giattina, J. D. and R. R. Garton. GRAPHICAL MODEL OF THERMOREGULATORY BEHAVIOR BY FISHES WITH A NEW MEASURE OF EURYTHERMALITY. *Can. J. Fish. Aquatic Sci.* 39(3):524-528. Mar. 1982. In English with French summ. SFA 27(3)
[U.S. EPA, Corvallis Environ. Res. Lab., Corvallis, OR 97333]

82-001562 Gradall, K. S. and W. A. Swenson. RESPONSES OF BROOK TROUT AND CREEK CHUBS TO TURBIDITY. *Trans. Am. Fish. Soc.* 111(3):392-395. May 1982. SFA 27(3)
[Cent. Lake Superior Environ. Stud., Univ. Wis., Superior 54880]

82-001563 Grillner, S. and P. Wallén. ON PERIPHERAL CONTROL MECHANISMS ACTING ON THE CENTRAL PATTERN GENERATORS FOR SWIMMING IN THE DOGFISH. *J. Exp. Biol.* 98:1-22. June 1982. SFA 27(3)
[Dep. Physiol. III, Karolinska Inst., Lidingövägen I, S-114 33 Stockholm, Sweden]

82-001564 Hailman, J. P. CONCEALMENT BY STRIPES DURING MOVEMENT AND BARS AT REST: FIELD EVIDENCE FROM COLOR CHANGES IN A GOATFISH AND A CORONETFISH. *Copeia* 1982(2):454-455. 28 May 1982. SFA 27(3)
[Dep. Zool., Univ. Wis., Madison 53706]

82-001565 Hoffman, C. J. ASSOCIATIONS BETWEEN THE ARROW GOBY *CLEVELANDIA IOS* (JORDAN AND GILBERT) AND THE GHOST SHRIMP *CALLIANASSA CALIFORNIENSIS* DANA IN NATURAL AND ARTIFICIAL BURROWS. *Pac. Sci.* 35(3):211-216. July 1981. SFA 27(3)
[Univ. Oreg., Oreg. Inst. Mar. Biol., Charleston 97420] *Clevelandia ios* is a small estuarine teleost that inhabits the burrows of the Thalassinid crustacean *Callianassa californiensis.* Field observations and laboratory experiments were undertaken to determine the relationship of *Clevelandia ios* and *Callianassa californiensis*, whether it be commensalism, mutualism, or parasitism. *Clevelandia ios* and *Callianassa californiensis* were found to co-occur in burrows less frequently than they would be expected to by chance, under both field and laboratory conditions.

BEHAVIOR (CONTINUED)

82-001565 CONTINUED In addition, the arrow gobies were found to inhabit the ghost shrimp burrows only during the spring and summer months.

82-001566 Jones, K. A. THE ROLE OF TEMPERATURE IN THE RESPONSE BY GOLDFISH (*CARASSIUS AURATUS*) TO CHEMICAL CUES. *Ph.D. dissertation, Tex. A&M Univ.* 136p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(10):3918. Apr. 1982. SFA 27(3)

82-001567 Kavaliers, M. ENDOGENOUS LUNAR RHYTHM IN THE BEHAVIOURAL THERMOREGULATION OF A TELEOST FISH, THE WHITE SUCKER, *CATOSTOMUS COMMERSONI*. *J. Interdisipl. Cycle Res.* 13(1):23-27. Feb. 1982. SFA 27(3)
[Dep. Zool., Univ. West. Ontario, London, ON N6A 5B7, Canada] The white sucker, *Catostomus commersoni*, displays a diel rhythm of behavioural thermoregulation in a horizontal thermal gradient. Under LD 12:12 single fish select significantly higher temperatures in the scotophase than in the photophase. An endogenous lunar rhythm exists in the absolute and maximum and minimum temperatures selected. Significantly higher temperatures (+2°C) are selected at the times of the new moon than at the times of the full moon. This provides the first demonstration of an endogenous lunar rhythm in the thermoregulatory behaviour of a vertebrate.

82-001568 Kavaliers, M. SEASONAL AND CIRCANNUAL RHYTHMS IN BEHAVIORAL THERMOREGULATION AND THEIR MODIFICATIONS BY PINEALECTOMY IN THE WHITE SUCKER, *CATOSTOMUS COMMERSONI*. *J. Comp. Physiol. A Sens. Neural Behav. Physiol.* 146(2):235-243. Apr. 1982. SFA 27(3)
[Dep. Zool., Univ. West. Ontario, London, ON N6A 5B7, Canada]

82-001569 Kennedy, G. J. A. and C. D. Strange. THE DISTRIBUTION OF SALMONIDS IN UPLAND STREAMS IN RELATION TO DEPTH AND GRADIENT. *J. Fish Biol.* 20(5):579-591. May 1982. SFA 27(3)
[Fish. Res. Lab., Dep. Agric. North. Ireland, 38 Costleroe Rd., Coleraine, Co. Londonderry, Northern Ireland] The distribution of various age classes of salmon and trout was assessed in upland streams by electrofishing. Water depths and site gradients were measured and correlated to fish densities. The fry of both species were significantly more abundant in shallow water; up to 75.3% of salmon fry and 72.2% of trout fry were captured in sites of mean depth <20 cm. Older trout were found mainly in the deeper areas, with a maximum of 7.4% captured in sites <20cm mean depth. Yearling fish were found in all the depth-ranges sampled, but with a tendency for higher numbers in mid-range depths. There were similar correlations in the abundance of each age class with the actual areas of shallow, mid-range and deep water habitat available within sites. Correlations of fish density with gradient indicated that trout were limited in their distribution to areas of lower flow, whereas salmon were not. Since depth and gradient were significantly negatively correlated, there was an apparent preference of trout for slightly deeper habitats than the equivalent year classes of salmon. The observed habitat segregation is discussed in terms of competition and selection.

82-001570 Kentouri, M. and P. Divanach. DIFFERENCES ET SIMILITUDES DANS LA GENESE DES COMPORTEMENTS LOCOMOTEUR ET TROPHIQUE DES STADES PRELARV AIRES DE *SPARUS AURATUS, DIPLODUS VULGARIS* ET *DIPLODUS SARGUS*. [DIFFERENCES AND SIMILARITIES IN THE GENESIS OF THE LOCOMOTOR AND TROPHIC BEHAVIOUR OF THE PRELARVAL STAGES OF *SPARUS AURATUS, DIPLODUS VULGARIS* AND *DIPLODUS SARGUS*.] *Aquaculture* 27(4):355-376. May 1982. In French with English

BEHAVIOR (CONTINUED)

82-001570 CONTINUED summ. SFA 27(3)
[Stn. Biol. Mar. Lagunaire, Quai de Bosc Prolongé, 34200 Sète, France] The behaviour of the prelarval stages of *Sparus auratus*, *Diplodus vulgaris* and *Diplodus sargus* was studied in 570-1 tanks at a temperature of 19°C. The different stages in swimming from hatching to the age of 4 days are as follows; period of dominating immobility (1st day); passive vertical migration (2nd day); first oblique swimming (3rd day); first horizontal swimming (4th day). The different speeds of swimming and the distances covered are calculated; the specific differences are mentioned. The predation training period is described and food selectivity at this stage is demonstrated. Aquacultural implications are discussed.

82-001571 Lane, E. B. and M. Whitear. SENSORY STRUCTURES AT THE SURFACE OF FISH SKIN. I. PUTATIVE CHEMORECEPTORS. *Zool. J. Linn. Soc.* 75(2):141-151. June 1982. SFA 27(3)
[M. Whitear: Dep. Zool., Univ. Coll., Gower St., London WC1E 6BT, England]

82-001572 Le Martret, M.-A. and P. Saglio. COMMUNICATION INTRASPECIFIQUE D'ORIGINE PHÉROMONALE CHEZ LE CARASSIN DORÉ IMMATURE, *CARASSIUS AURATUS* L. I. MISE EN ÉVIDENCE OLFACTOMÉTRIQUE DU PHÉNOMÈNE. [THE ROLE OF PHEROMONES IN INTRASPECIFIC COMMUNICATION IN IMMATURE GOLDFISH, *CARASSIUS AURATUS* L. I. OLFACTOMETRIC DEMONSTRATION.] *Biol. Behav.* 7(1):41-54. 1982. In French with English summ. SFA 27(3)
[Lab. Physiol. Poissons, I.N.R.A., C.N.R.Z., F78350 Jouy-en-Josas, France] Olfactometric observations on immature goldfish (*Carassius auratus*) recieving water from a tank that held conspecifics pointed out the occurence of pheromonal communication not related to reproductive behavior in this species. Compared with the controls receiving only dechlorinated tap water, the grouping tendency is in all cases studied significantly increased while the attractivity of the effluent varies according to the density considered. The highest attractivity is observed with 10 goldfish held 24h in 25 l of water at 20°C. For 30 fish held in the same conditions we observe some repulsive effect. The value of these first results is discussed and hypotheses on the nature and origin of the chemicals involved are presented.

82-001573 Martini, F. H. and K. Welch. A REPORT ON A NONFATAL SHARK ATTACK IN THE HAWAIIAN ISLANDS. *Pac. Sci.* 35(3):237-240. July 1981. SFA 27(3)
[P.O. Box 207, Lahaina, Maui, HI 96761]

82-001574 Meyer, J. H. BEHAVIORAL RESPONSES OF WEAKLY ELECTRIC FISH TO COMPLEX IMPEDANCES. *J. Comp. Physiol. A Sens. Neural Behav. Physiol.* 145(4):459-470. 1 Mar. 1982. SFA 27(3)
[Scripps Inst. Oceanogr., A-002, La Jolla, CA 92093]

82-001575 Ogilvie, D. M. BEHAVIORAL RESPONSE OF GOLDFISH (*CARASSIUS AURATUS*) TO DEOXYGENATED WATER. *Copeia* 1982(2):434-439. 28 May 1982. SFA 27(3)
[Dep. Zool., Univ. West. Ontario, London, ON N6J 5B7, Canada]

82-001576 Ogilvy, C. S. and A. B. DuBois. TAIL THRUST OF BLUEFISH *POMATOMUS SALTATRIX* AT DIFFERENT BUOYANCIES, SPEEDS, AND SWIMMING ANGLES. *J. Exp. Biol.* 98:105-117. June 1982. SFA 27(3)
[John B. Pierce Found. Lab., 290 Congress Ave., New Haven, CT 06519]

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82-001577 Pavlov, D. S. and L. G. Shtaf. DISTRIBUTION OF DOWNSTREAM-MIGRANT JUVENILE FISH IN A RHEOGRADIENT STREAM. *Dokl. Biol. Sci. (Engl. Transl. Dokl. Akad. Nauk SSSR Ser. Biol.)* 260(1-6):445-448. Mar. 1982. SFA 27(3)
[A. N. Severtsov Inst. Evol. Morphol. Ecol. Anim., Acad. Sci. USSR, Moscow, USSR]

82-001578 Peters, H. M. and S. Berns. DIE MAULBRUTPFLEGE DER CICHLIDEN. UNTERSUCHUNGEN ZUR EVOLUTION EINES VERHALTENSMUSTERS. [MOUTH-BROODING IN CICHLIDS. A STUDY OF THE EVOLUTION OF A BEHAVIOUR PATTERN.] *Z. Zool. Syst. Evolutionsforsch.* 20(1):18-52. Mar. 1982. In German with English summm. SFA 27(3)
[Inst. Biol. III Univ., Lehrstuhl Zoophysiol., Abt. Verhaltensphysiol., Bein Kepferhammer 8, D-7400 Tübingen 1, West Germany]

82-001579 Quinn, T. P. COMPASS ORIENTATION OF JUVENILE SOCKEYE SALMON (*ONCORHYNCHUS NERKA*). *Ph.D. dissertation, Univ. Wash.* 98p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(12):4709. June 1982. SFA 27(3)

82-001580 Sivak, J. G. OPTICAL CHARACTERISTICS OF THE EYE OF THE FLOUNDER. *J. Comp. Physiol. A Sens. Neural Behav. Physiol.* 146(3):345-349. May 1982. SFA 27(3)
[Sch. Optom., Univ. Waterloo, Waterloo, ON N2L 3G1, Canada]

82-001581 Smith, R. J. F. REACTION OF *PERCINA NIGROFASCIATA, AMMOCRYPTA BEANI,* AND *ETHEOSTOMA SWAINI* (PERCIDAE, PISCES) TO CONSPECIFIC AND INTERGENERIC SKIN EXTRACTS. *Can. J. Zool.* 60(5):1067-1072. May 1982. IN English with French summ. SFA 27(3)
[Biol. Dep., Univ. Saskatchewan, Saskatoon, SK 57N 0W0, Canada]

82-001582 Sosiak, A. J. BUOYANCY COMPARISONS BETWEEN JUVENILE ATLANTIC SALMON AND BROWN TROUT OF WILD AND HATCHERY ORIGIN. *Trans. Am. Fish. Soc.* 111(3):307-311. May 1982. SFA 27(3)
[Resour. Dep., Montreal Eng. Co., Ltd., 900 125-9th Ave. SE, Calgary, AB T2G 0P6, Canada]

82-001583 Thomas, G. L. LOCATION AND ENUMERATION OF THE PELAGIC SCHOOLING FISHES ALONG THE CONTINENTAL SHELF BREAK. *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:20. 1981. Abstract only. SFA 27(3)

82-001584 Vancil, R.; G. Zuerlein and L. Hesse. LETHAL AND PREFERRED TEMPERATURES OF LAKE MCCONAUGHY RAINBOW TROUT VERSUS DOMESTIC STRAIN RAINBOW TROUT. *Nebr. Game Parks Comm. Tech. Ser.* No. 7. p. 4-20. 1979. SFA 27(3)
[Investigations were conducted in 1978 to determine the temperature tolerance and preference of the McConaughy strain rainbow trout and make comparisons with a domestic strain. Lethal and preferred temperature tests were performed in the laboratory on both strains. Critical thermal maxima tests were conducted in the field on the McConaughy strain. The ultimate upper lethal temperature for the McConaughy strain was determined to be approximately 27°C while that for the domestic strain was slightly less than 26°C. The final preferenda for the McConaughy and domestic strains were 16.4 to 16.7°C and 16.9 to 17.2°C, respectively. A difference in mean ages of the

BEHAVIOR (CONTINUED)

82-001584 CONTINUED two strains probably influenced temperature selection. The mean monthly critical thermal maxima for the McConaughy strain fish ranged from 30.6 to 32.7°C and increased throughout the season (April to August). It appears that high temperature generally should not be a critical limiting factor for rainbow trout fingerlings in the North Platte Valley tributary streams.

82-001585 Videler, J. J. and D. Weihs. ENERGETIC ADVANTAGES OF BURST-AND-COAST SWIMMING OF FISH AT HIGH SPEEDS. *J. Exp. Biol.* 97:169-178. Apr. 1982. SFA 27(3)

[Dep. Zool., Groningen State Univ., P.O. Box 14, 9750 AA Haren, Netherlands] A theoretical model describes how an intermittent swimming style can be energetically advantageous over continuous swimming at high average velocities. Kinematic data are collected from high-speed ciné pictures of free swimming cod and saithe at high velocities in a burst-and-coast style. These data suggest that fish make use of the advantages shown by choosing initial and final burst velocities close to predicted optimal values. The limiting role of rapid glycogen depletion in fast white anaerobic muscle fibres is discussed.

82-001586 Wakeman, J. M. and D. E. Wohlschlag. SWIMMING CAPABILITIES OF SPOTTED SEATROUT. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:35-52. 1981[1982]. SFA 27(3)

[Dep. Zool., La. Tech Univ., Ruston 71272]

82-001587 Watanabe, M. and Y. Tamoto. THE MOTIVATION OF CARE FOR OFFSPRINGS IN THE CICHLID *SAROTHERODON MOSSAMBICUS*. *Proc. Jpn. Acad. Ser. B Phys. Biol. Sci.* 57(7):266-270. Sept. 1981. SFA 27(3)

[Dep. Biol., Coll. Liberal Arts Sci., Okayama, Japan]

82-001588 Webb, P. W. AVOIDANCE RESPONSES OF FATHEAD MINNOW TO STRIKES BY FOUR TELEOST PREDATORS. *J. Comp. Physiol. A Sens. Neural Behav. Physiol.* 147(3):371-378. July 1982. SFA 27(3)

[Sch. Nat. Resour., Univ. Mich., Ann Arbor 48109] Predator avoidance behavior of fathead minnow (*Pimephales promelas*) attacked by four teleosts (tiger musky, *Esox* sp; rainbow trout, *Salmo gairdneri*; smallmouth bass, *Micropterus dolomieu*; rock bass, *Ambloplites rupestris*) was analyzed using stop-action video-tape recordings of predator-prey interactions. The predators represented a range of body forms. 75 to 90% of minnows responded to strikes by trout, bass and rock bass, but only 28% responded to strikes by tiger musky. Responses were 54 to 94% successful in evading a strike. Two prey avoidance response patterns were found. Type-1 responses were low intensity, non-sustained turning maneuvers away from more distant and more slowly moving predators. Type-2 responses were high intensity turning maneuvers followed by sustained swimming away from closer and faster-moving predators. All responses to tiger musky were type-2 responses. Prey speeds in avoidance responses were lower for rock bass than for the other three predators. Response thresholds for fathead minnow escape maneuvers were calculated at the start of the motor response, and evaluated with respect to predator size. Predator size was calculated from the dimensions of the silhouette viewed by the prey as the mean of predator depth and width. Prey reaction distance decreased and predator visual angle increased with predator size for trout, bass and rock bass. Reaction distance was smaller, and visual angle larger for responses to tiger musky. The rates of change of the visual angle at the start of a response, the apparent looming threshold (ALT), were similar for trout, bass and rock bass, but 15-80 times larger for tiger musky. The results suggest that

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82-001588 CONTINUED configuration differences between the predators are important contributors to the stimulus initiating avoidance responses. It is suggested that the rounded body cross-section of esocids is associated with higher response thresholds than elliptical and lenticular cross-sections of trout, bass and rock bass.

82-001589 Wynes, D. L. and T. E. Wissing. RESOURCE SHARING AMONG DARTERS IN AN OHIO STREAM. *Am. Midl. Nat.* 107(2):294-304. Apr. 1982. SFA 27(3)
[Dep. Environ. Sci., Nichols Coll., Dudley, MA 01570] This study quantified predator-prey interactions involving three darter species (*Etheostoma caeruleum, E. zonale* and *E. blennioides*) and macroinvertebrates of the upper Little Miami River, Ohio, and the extent of seasonal food and habitat partitioning among these fishes. Food overlap values (C$\lambda$) based on biomass were generally lower than those computed from the numbers of prey items in the annual diets (C$\lambda$ = 0.41-0.75 and 0.72-0.84, respectively). These differences reflected size-selective feeding behavior and variability in the dry weights of food organisms. Feeding intensity was influenced by water temperature, while the contributions of the various invertebrate taxa to the diets shifted with changes in the abundances of these forms. *Etheostoma zonale* and *E. blennioides* selected food items in the size ranges of 1-5 and 1-6 mm, respectively; the range for *E. caeruleum* was 1-9 mm. Darter numbers in the riffles changed seasonally in response to the timing of reproduction. These shifts resulted in low overlap values (C$\lambda$ = 0.41-0.44) based on habitat use. We concluded that the darters coexist through resource sharing which reduces interspecific competition for food and space.

LIFE HISTORY-GENERAL WORKS

82-001590 Baltz, D. M. and P. B. Moyle. LIFE HISTORY CHARACTERISTICS OF TULE PERCH (*HYSTEROCARPUS TRASKI*) POPULATIONS IN CONTRASTING ENVIRONMENTS. *Environ. Biol. Fishes* 7(3):229-242. 1 June 1982. SFA 27(3)
[Dep. Wildl. Fish. Biol., Univ. Calif., Davis 95616] The life history characteristics of tule perch were compared within and among populations in three drainages with substantially different environmental conditions. Within populations there were, in general, substantial increases in brood size, size of young, brood weight, and gonadal-somatic index (GSI) with age and with size of female. In at least one population there was a trade-off between the number and size of young produced. However, in a lake where individual growth was very slow, brood weight, GSI, and other life history characters showed decreasing trends with age. Among populations in isolated drainages, female length at first reproduction and longevity varied directly and mean brood size varied inversely with environmental predictability. Morphological and geological evidence and some comparative litter characteristics suggest that life history differences among populations in isolated drainages are in part genetic.

82-001591 Craig, P. C.; W. B. Griffiths; L. Haldorson and H. McElderry. ECOLOGICAL STUDIES OF ARCTIC COD (*BOREOGADUS SAIDA*) IN BEAUFORT SEA COASTAL WATERS, ALASKA. *Can. J. Fish. Aquatic Sci.* 39(3):395-406. Mar. 1982. In English with French summ. SFA 27(3)
[LGL Ltd., Environ. Res. Assoc., Suite 333, 2453 Beacon Ave., Sidney, BC V8L 1X7, Canada]

LIFE HISTORY-GENERAL WORKS (CONTINUED)

82-001592 Frank, K. T. and W. C. Leggett. ENVIRONMENTAL REGULATION OF GROWTH RATE, EFFICIENCY, AND SWIMMING PERFORMANCE IN LARVAL CAPELIN (*MALLOTUS VILLOSUS*), AND ITS APPLICATION TO THE MATCH/MISMATCH HYPOTHESIS. *Can. J. Fish. Aquatic Sci.* 39(5):691-699. 1982. In English with French summ. SFA 27(3)
[Dep. Biol., McGill Univ., 1205 Ave. Docteur Penfield, Montreal, PQ H3A 1B1, Canada]

82-001593 George, T. T. THE CHINESE GRASS CARP, *CTENOPHARYNGODON IDELLA*, ITS BIOLOGY, INTRODUCTION, CONTROL OF AQUATIC MACROPHYTES AND BREEDING IN THE SUDAN. *Aquaculture* 27(3):317-327. Apr. 1982. SFA 27(3)
[Fish. Res. Cent., Agric. Res. Corp., Khartoum, Sudan]

82-001594 Martinez, G. J. A STUDY OF AGE, GROWTH, AND FOOD HABITS OF CERTAIN GAME FISHES IN CORDELL HULL RESERVOIR, TENNESSEE. *Tenn. Tech J.* 16:67. 1981. Abstract only. SFA 27(3)
[Tenn. Tech Univ., Cookeville 38501]

82-001595 McKee, P. M. and B. J. Parker. THE DISTRIBUTION, BIOLOGY, AND STATUS OF THE FISHES *CAMPOSTOMA ANOMALUM*, *CLINOSTOMUS ELONGATUS*, *NOTROPIS PHOTOGENIS* (CYPRINIDAE), AND *FUNDULUS NOTATUS* (CYPRINODONTIDAE) IN CANADA. *Can. J. Zool.* 60(6):1347-1358. June 1982. SFA 27(3)
[Beak Consultants Ltd., 6870 Goreway Dr., Mississauga, ON, L4V 1P1 Canada]

82-001596 Minami, T. [THE EARLY LIFE HISTORY OF A FLOUNDER *PLEURONICHTHYS CORNUTUS*.] *Bull. Jpn. Soc. Sci. Fish.* 48(3):369-374. Mar. 1982. In Japanese with English summ. SFA 27(3)
[Dep. Fish., Fac. Agric., Kyoto Univ., Kyoto 606, Japan]

82-001597 Palko, B. J.; G. L. Beardsley and W. J. Richards. SYNOPSIS OF THE BIOLOGICAL DATA ON DOLPHIN-FISHES, *CORYPHAENA HIPPURUS* LINNAEUS AND *CORYPHAENA EQUISELIS* LINNAEUS. *NOAA Tech. Rep. NMFS Circ.* 443. iv + 28p. Apr. 1982. SFA 27(3)
[NMFS, 3500 Delwood Beach Rd., Panama City, FL 32407]

82-001598 Sakai, M. and A. Goto. [STUDIES ON THE FRESHWATER FISH IN HOKKAIDO, JAPAN--I. BREEDING HABITS, GROWTH AND DISTRIBUTION OF A GOBY, *CHAENOGOBIUS CASTANEA* (O'SHAUGHNESSY).] *Bull. Fac. Fish. Hokkaido Univ.* 33(1):9-23. Mar. 1982. In Japanese with English summ. SFA 27(3)
[Grad. Sch. Environ. Sci., Univ. Tsukuba, Japan]

82-001599 Seagle, H. H., Jr. and J. W. Nagel. LIFE CYCLE AND FECUNDITY OF THE AMERICAN BROOK LAMPREY, *LAMPETRA APPENDIX*, IN TENNESSEE. *Copeia* 1982(2):362-366. 28 May 1982. SFA 27(3)
[Ill. Nat. Hist. Surv., Pool 26 River Res. Lab., Grafton 62037] American brook lampreys, *Lampetra appendix* were collected from Buffalo and North Indian creeks in northeastern Tennessee. Length/frequency data indicate that the larval period lasts at least 4½ years and possibly more. Adults live one-half year; thus, the minimum life span is 5 years. Spawning occurs in March and external signs of metamorphosis begin in August and continue through October. The mean ovarian follicle estimate for gravid females was 2,883 and the sex ratio was 1.2 M:1 F, not significantly different from 1:1.

LIFE HISTORY-GENERAL WORKS (CONTINUED)

82-001600 Sekerak, A. D. YOUNG-OF-THE-YEAR COD (*BOREOGADUS*) IN LANCASTER SOUND AND WESTERN BAFFIN BAY. *Arctic* 35(1):75-87. Mar. 1982. SFA 27(3)
[LGL Ltd., 2453 Beacon Ave., Sidney, BC V8L 1X7, Canada]

82-001601 Stacey, N. E. and A. S. Hourston. SPAWNING AND FEEDING BEHAVIOR OF CAPTIVE PACIFIC HERRING, *CLUPEA HARENGUS PALLASI*. *Can. J. Fish. Aquatic Sci.* 39(3):489-498. Mar. 1982. In English with French summ. SFA 27(3)
[Dep. Zool., Univ. Alberta, Edmonton, AB T6G 2E9, Canada]

82-001602 Stribley, J. A. and R. H. Stasiak. AGE, GROWTH, AND FOOD HABITS OF THE PLAINS TOPMINNOW, *FUNDULUS SCIADICUS* COPE, IN KEITH COUNTY, NEBRASKA. *Proc. Nebr. Acad. Sci. Affil. Soc.* 92:17-18. 1982. Abstract only. SFA 27(3)
[Dep. Biol., Univ. Nebr., Omaha 68182]

82-001603 Thorson, T. B. LIFE HISTORY IMPLICATIONS OF A TAGGING STUDY OF THE LARGETOOTH SAWFISH, *PRISTIS PEROTTETI*, IN THE LAKE NICARAGUA-RÍO SAN JUAN SYSTEM. *Environ. Biol. Fishes* 7(3):207-228. 1 June 1982. SFA 27(3)
[Sch. Life Sci., Univ. Nebr., Lincoln 68588-0118]

82-001604 Tung, I.-H. [ON THE FISHERY BIOLOGY OF THE GREY MULLET, *MUGIL CEPHALUS* LINNAEUS, IN TAIWAN.] *Rep. Inst. Fish. Biol. Minist. Econ. Aff. Natl. Taiwan Univ.* 3(4):38-102. Dec. 1982. In Chinese with English summ. SFA 27(3)
[Inst. Fish. Biol., Natl. Taiwan Univ., Taipei, Taiwan, China]

82-001605 Walsh, S. J. and B. M. Burr. DISTRIBUTION, MORPHOLOGY AND LIFE HISTORY OF THE LEAST BROOK LAMPREY, *LAMPETRA AEPYPTERA* (PISCES: PETROMYZONTIDAE), IN KENTUCKY. *Brimleyana* 6:83-100. Dec. 1981. SFA 27(3)
[Dep. Zool., South. Ill. Univ., Carbondale 62901]

82-001606 Wang, J. C. S. EARLY LIFE HISTORY AND PROTECTION OF THE TIDEWATER GOBY *EUCYCLOGOBIUS NEWBERRYI* (GIRARD) IN THE RODEO LAGOON OF THE GOLDEN GATE NATIONAL RECREATION AREA. *Univ. Calif. (Davis) Inst. Ecol. Tech. Rep.* No. 7. iii + 24p. Apr. 1982. SFA 27(3)
[23 Mountair Court, Clayton, CA 94517]

82-001607 Westhaus, P. FISCHEREIBIOLOGISCHE UNTERSUCHUNGEN AM GOLDLACHS (*ARGENTINA SILUS*) IM SEEGEBIET DER SHETLAND-FÄRÖER-INSELN UND IN IN GEWÄSSERN WESTLICH GROßBRITANNIENS. [BIOLOGICAL INVESTIGATIONS ON *ARGENTINA SILUS* IN THE AREA OF THE SHETLAND-FAROE-ISLANDS AND WEST OF GREAT BRITAIN.] *Arch. Fischereiwiss.* 32(1-3):13-28. Apr. 1982. In German with English summ. SFA 27(3)
[Inst. Hydrobiol. Fischereiwiss., Univ. Hamburg, Hamburg, West Germany]

82-001608 Williams, J. S. LIFE HISTORY ASPECTS OF THE BROWN DARTER, *ETHEOSTOMA EDWINI* (PISCES: PERCIDAE), IN NORTHWEST FLORIDA. *M.S. thesis, Univ. West Fla.* 48p. 1981. From Masters Abstr. 20(2):132. June

LIFE HISTORY-GENERAL WORKS (CONTINUED)

82-001608 CONTINUED 1982. SFA 27(3)
Life history aspects of *Etheostoma edwini* were studied in Pond Creek, Santa Rosa County, Florida from July 1974 to April 1975, and in March 1976. The preferred habitat of *E. edwini* was found to be aquatic vegetation in flowing water. As evidenced by gonadal condition, spawning ended in early fall in 1974 and began again in midwinter in 1975, but was delayed until spring in 1976. Spawning activity was apparently temperature regulated. Age-group 1 fish were sexually mature. Spawning position ranged from vertical to inverted in an aquarium, and eggs were laid on vegetation. Larvae from aquarium spawnings hatched an average of 6.5 days after egg fertilization. In nature males grew faster than females. The male-female sex ratio was 1:2. Most individuals lived two years, with highest mortality occurring in spring. The diet of *E. edwini* consisted almost entirely of aquatic insects and crustaceans. Most individuals were parasitized by a digenetic trematode of the genus *Crepidostomum*.

82-001609 Wood, R. J. THE THAMES ESTUARY HERRING STOCK. *Fish. Res. Tech. Rep. Minist. Agric. Fish. Food (Lowestoft)* No. 64. 21p. 1981. SFA 27(3)
[Minist. Agric. Fish. Food, Lowestoft, England]

82-001610 Zuerlein, G. THE WHITE PERCH, *MORONE AMERICANA* (GMELIN) IN NEBRASKA. *Nebr. Game Parks Comm. Tech. Ser.* No. 8. 108p. 1981. SFA 27(3)
Available from Nebr. Game Parks Comm., P.O. Box 30370, Lincoln 68503.

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC.

82-001611 Argyle, R. L. ALEWIVES AND RAINBOW SMELT IN LAKE HURON: MIDWATER AND BOTTOM AGGREGATIONS AND ESTIMATES OF STANDING STOCKS. *Trans. Am. Fish. Soc.* 111(3):267-285. May 1982. SFA 27(3)
[U.S. FWS, Great Lakes Fish. Lab., 1451 Green Rd., Ann Arbor, MI 48105]

82-001612 Bailey, R. S. THE POPULATION BIOLOGY OF BLUE WHITING IN THE NORTH ATLANTIC. *Adv. Mar. Biol.* 19:257-355. 1982. SFA 27(3)
[Dep. Agric. Fish. Scotland, Mar. Lab., Aberdeen, Scotland]

82-001613 Beard, T. D. POPULATION DYNAMICS OF YOUNG-OF-THE-YEAR BLUEGILL. *Wis. Dep. Nat. Resour. Tech. Bull.* No. 127. 32p. 1982. SFA 27(3)
[Wis. Dep. Nat. Resour., Box 397, 1341 2nd Ave., Cumberland 54829] Factors influencing bluegill year class strength were evaluated in 3 small, winterkill lakes in northern Wisconsin during 1971-76. Only bluegill were present during the 1st 4 years of the study while walleye and other warm water species were added in 2 of the lakes during 1975-76. The density of parent bluegill was doubled in the remaining lake and no other species added during this latter study segment. When no other species were present, the most important single variables affecting year class strength were size of parent females and date of 1st fry dispersal from the nest, the latter indicating that spawning beginning after the 1st week in July resulted in a weak year class. Water temperatures below 21 C also had an important impact on year class strength by interupting or postponing spawning and slowing development of eggs and fry although no correlation was found between June water temperatures and standing crop of fall fingerlings. Daily mortality was much higher during the 4-day period following fry dispersal from the nest than during other life history stages, suggesting that year class strength

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC. (CONTINUED)

82-001613 CONTINUED may be set at this time. Doubling the number of parent bluegill did not increase the number of fingerlings present in the fall although fry production increased. Increased fry production was also apparent when walleye and other warm water species were stocked, but fingerling production was sharply decreased. Where walleye were present, predation was determined to be the primary factor in the decrease. Young bluegill were insignificant food items of the other warm water species. However, low level predation by yellow perch fingerlings may have had a significant impact on bluegill numbers in 1 study year although other, unknown, forms of competition are also thought to have been involved. Reduction of bluegill numbers by pumping fry from the nest and by selective chemical treatment of the limnetic area of a lake are discussed.

82-001614 Borgmann, U. PARTICLE-SIZE-CONVERSION EFFICIENCY AND TOTAL ANIMAL PRODUCTION IN PELAGIC ECOSYSTEMS. *Can. J. Fish. Aquatic Sci.* 39(5):668-674. May 1982. In English with French summ. SFA 27(3)
[Can. Cent. Inland Waters, Burlington, ON L7R 4A6, Canada]

82-001615 Ciepielewski, W. POPULATION OF PIKE (*ESOX LUCIUS* L.) IN POND TYPE LAKE WARNIAK IN 1969-1978. *Ekol. Pol.* 29(1):35-51. 1981. In English with Polish summ. SFA 27(3)
[Inland Fish. Inst., 10-957 Olsztyn, Kortowo, Poland] Maximum catches in 1969-1978 were 23 kg/ha/yr, whereas the minimum catches were less than 1 kg/ha/yr. The mean weight of caught fish was the highest in the years of minimal catches. Usually 2-3 years old individuals were caught. Virtual populations were from several hundreds to over 2200 individuals. In 1977 the virtual pike population decreased to 74 individuals. The biomass of pike in 1969-1976 ranged between 10 and 40.6 kg/ha/yr, and of production--between 6.6 to 41.2 kg/ha/yr. The sex ratio in dominant age groups in the population was 1:1.

82-001616 Craig, J. F. A NOTE ON GROWTH AND MORTALITY OF TROUT, *SALMO TRUTTA* L., IN AFFERENT STREAMS OF WINDERMERE. *J. Fish Biol.* 20(4):423-429. Apr. 1982. SFA 27(3)
[Freshwater Biol. Assoc., Windermere Lab., Ambleside, Cumbria, England] Trout were sampled in six afferent streams of Windermere during the spawning season. The main migration of adult trout into the streams took place during early November. Length-weight relationships and scale-fish length relationships are given. There was no significant difference in length for age or sex between cohorts within streams. Three groups of fish could be identified depending on whether the fish entered the lake at 1+,2+, or 3+ years. The percentage number of the population entering the lake at each of these ages was 16, 70 and 14%, respectively. After the fish had migrated from the streams their growth in length fitted the von Bertalanffy growth model. Fish entering the lake at 1+ and 2+ years had similar $A_{\infty}$ values (6.31 and 6.97 years) as the latter grew slightly faster in the lake. Those entering the lake at 3+ years grew at a slower rate to the other two groups but achieved a longer ultimate length. Faster growing fish had higher instantaneous mortality rates. Twenty-eight to 29% of the males remaining in the stream at 1+ years became sexually mature. Faster growing females became sexually mature earlier. Only those fish which entered the lake at 1+ years grew close, during their early years before sexual maturity, to the theoretical maximum given by Elliott's model.

82-001617 Flain, M. QUINNAT SALMON RUNS, 1965-78, IN THE GLENARIFFE STREAM, RAKAIA RIVER, NEW ZEALAND. *N.Z. Minist. Agric. Fish. Occas. Publ.* No. 28. 22p. 1982. SFA 27(3)

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC. (CONTINUED)

82-001618 Loftus, D. H. LARVAL FISH SAMPLING IN LAKE HURON, 1978. *Ontario Fish. Tech. Rep. Ser.* No. 2. iii + 12p. 1982. SFA 27(3)
[Ontario Minist. Nat. Resour., Fish. Br., Queen's Park, Toronto, ON M7A 1W3, Canada]

82-001619 McGregor, A. J. and S. L. Marshall. ORIGINS OF CHUM SALMON (*ONCORHYNCHUS KETA*) IN THE EXCURSION INLET PURSE SEINE FISHERY OF 1981 BASED ON SCALE PATTERN ANALYSIS. *Alaska Dep. Fish Game Inf. Leafl.* No. 201. iv + 34p. June 1982. SFA 27(3)
[Alaska Dep. Fish Game, Div. Commer. Fish., Juneau]

82-001620 Ralston, S. V. D. A STUDY OF THE HAWAIIAN DEEPSEA HANDLINE FISHERY WITH SPECIAL REFERENCE TO THE POPULATION DYNAMICS OF OPAKAPAKA, *PRISTIPOMOIDES FILAMENTOSUS* (PISCES: LUTJANIDAE). *Ph.D. dissertation, Univ. Wash.* 222p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(12):4671. June 1982. SFA 27(3)

82-001621 Vaughan, D. S. and W. Van Winkle. CORRECTED ANALYSIS OF THE ABILITY TO DETECT REDUCTIONS IN YEAR-CLASS STRENGTH OF THE HUDSON RIVER WHITE PERCH (*MORONE AMERICANA*) POPULATION. *Can. J. Fish. Aquatic Sci.* 39(5):782-785. May 1982. In English with French summ. SFA 27(3)
[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830]

82-001622 Viljanen, M. and I. J. Holopainen. POPULATION DENSITY OF PERCH (*PERCA FLUVIATILIS* L.) AT EGG, LARVAL AND ADULT STAGES IN THE DYS-OLIGOTROPHIC LAKE SUOMUNJÄRVI, FINLAND. *Ann. Zool. Fenn.* 19(1):39-46. 1982. SFA 27(3)
[Karelian Inst., Sect. Ecol., Univ. Joensuu, Box 111, 80101 Joensuu 10, Finland] Between 1974 and 1977 the population density of perch at egg, larval and adult stages in the dys-oligotrophic Lake Suomunjärvi, eastern Finland, was studied quantitatively. In addition, data on fecundity, age, growth, size distribution and biomass were gathered. The density of eggs deposited on the bottom was calculated from egg clusters sampled quantitatively by a scuba-diver. This gave a mean density of 320,000 eggs/ha at the 0-3 depth zone, with only low variation between years, sites and depths. Larvae about one week old were sampled quantitatively with the Clarke-Bumpus and CalCoFi net samplers. The results obtained with the latter, which gave much higher densities (mean 6,850 larvae/ha) than the former (2,850/ha), are considered more reliable because of the larger mouth area of the sampler and the higher number of larvae caught. To estimate the adult population density, a scuba-diver counted the fish directly and the reliability of the method was established by comparing the diver's estimation with that given using a capture-mark-recapture method in a small isolated bay. The mean population density of perch of three years or older was 312 ind./ha. The survival in the total populations of the lake was 8% from deposited eggs to one week old larvae and 0.05% from eggs to three year old fish.

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC.

82-001623 Balon, E. K. ABOUT THE COURTSHIP RITUALS IN FISHES, BUT ALSO ABOUT A FALSE SENSE OF SECURITY GIVEN BY CLASSIFICATION SCHEMES, 'COMPREHENSIVE' REVIEWS AND COMMITTEE DECISIONS. *Environ. Biol. Fishes*

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

82-001623 CONTINUED 7(3):193-197. 1 June 1982. SFA 27(3)
[Dep. Zool., Coll. Biol. Sci., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

82-001624 Beacham, T. D. FECUNDITY OF COHO SALMON (*ONCORHYNCHUS KISUTCH*) AND CHUM SALMON (*O. KETA*) IN THE NORTHEAST PACIFIC OCEAN. *Can. J. Zool.* 60(6):1463-1469. June 1982. SFA 27(3)
[Dep. Fish. Oceans, Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada] Significant regional and annual variability in fecundity of coho salmon (*Oncorhynchus kisutch*) and chum salmon (*O. keta*) in British Columbia was detected during this investigation. A Kodiak Island (Alaska) coho salmon stock was more fecund than southern stocks in British Columbia and Washington. Fecundity ranged from 2450 to 2850 eggs per female at 53.6 cm postorbital-hypural length for Vancouver Island stocks to over 4400 eggs per female for a Kodiak Island stock at the same length. Chum stocks on Vancouver Island and the Queen Charlotte Islands generally had fecundities less than 3200 eggs per female at 58.8 cm postorbital-hypural length, whereas chum of equal lengths in mainland British Columbia stocks ranged from 3200 to 3450 eggs per female. Older chum and coho were usually more fecund than younger ones, but this difference could be accounted for by differences in mean length-at-age, fecundity being related to body size.

82-001625 Bronstein, P. M. BREEDING, PATERNAL BEHAVIOR, AND THEIR INTERRUPTION IN *BETTA SPLENDENS*. *Anim. Learn. Behav.* 10(2):145-151. May 1982. SFA 27(3)
[Dep. Psychol., Univ. Mich., Flint 48503]

82-001626 Coates, D. SOME OBSERVATIONS ON THE SEXUALITY OF HUMBUG DAMSELFISH, *DASCYLLUS ARUANUS* (PISCES, POMACENTRIDAE) IN THE FIELD. *J. Comp. Ethol.* 59(1):7-18. 1982. SFA 27(3)
[Dep. Primary Ind. Fish. Res. Surv., P.O. Box 417, Konedobu, Papua New Guinea]

82-001627 Coyer, J. A. OBSERVATIONS ON THE REPRODUCTIVE BEHAVIOR OF THE GIANT KELPFISH, *HETEROSTICHUS ROSTRATUS* (PISCES: CLINIDAE). Copeia 1982(2):244-250. 28 May 1982. SFA 27(3)
[Catalina Mar. Sci. Cent., Box 398, Avalon, CA 90704]

82-001628 Crabtree, R. E. and D. P. Middaugh. OYSTER SHELL SIZE AND THE SELECTION OF SPAWNING SITES BY *CHASMODES BOSQUIANUS*, *HYPLEUROCHILUS GEMINATUS*, *HYPSOBLENNIUS IONTHAS* (PISCES, BLENNIIDAE) AND *GOBIOSOMA BOSCI* (PISCES, GOBIIDAE) IN TWO SOUTH CAROLINA ESTUARIES. *Estuaries* 5(2):150-155. June 1982. SFA 27(3)
[Va. Inst. Mar. Sci., Gloucester Point 23062] Utilization of empty oyster shells as a habitat and spawning substrate by the naked goby, *Gobiosoma bosci*, the striped blenny, *Chasmodes bosquianus*, crested blenny, *Hypleurochilus geminatus*, and freckled blenny, *Hypsoblennius ionthas*, was studied in the North Inlet and North Edisto River estuaries of South Carolina. Gape and length of shells occupied by fishes were measured. Fish inhabited and spawned in only a small portion of the size range of shells available. *G. bosci*, the smallest species studied, spawned in shells with narrower gapes than did *C. bosquianus* or *H. geminatus* and in shorter shells than did *C. bosquianus*. Thus, *G. bosci* may escape competition

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

82-001628 CONTINUED for spawning sites. Overall, there was a positive correlation between fish length and both gape and length of shells occuped by egg-guarding males.

82-001629 Crapon de Caprona, M.-D. THE INFLUENCE OF EARLY EXPERIENCE ON PREFERENCES FOR OPTICAL AND CHEMICAL CUES PRODUCED BY BOTH SEXES IN THE CICHLID FISH *HAPLOCHROMIS BURTONI* (*ASTATOTILAPIA BURTONI*, GREENWOOD 1979). *J. Comp. Ethol.* 58(4):329-361. Apr. 1982. In English with German summ. SFA 27(3)
[Fak. Biol., Univ. Bielefeld, Postfach 8640, D-4800 Bielefeld 1, West Germany]

82-001630 MacDonald, C. D. REPRODUCTIVE STRATEGIES AND SOCIAL ORGANIZATION IN DAMSELFISHES. *Ph.D. dissertation, Univ. Hawaii* 241p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(12):4708. June 1982. SFA 27(3)

82-001631 Matsumiya, Y.; T. Mitani and M. Tanaka. CHANGES IN DISTRIBUTION PATTERN AND CONDITION COEFFICIENT OF THE JUVENILE JAPANESE SEA BASS WITH THE CHIKUGO RIVER ASCENDING. *Bull. Jpn. Soc. Sci. Fish.* 48(2):129-138. Feb. 1982. SFA 27(3)
[Fac. Fish., Nagasaki Univ., Nagasaki 852, Japan]

82-001632 Nakatsuru, K. and D. L. Kramer. IS SPERM CHEAP? LIMITED MALE FERTILITY AND FEMALE CHOICE IN THE LEMON TETRA (PISCES, CHARACIDAE). *Science* 216(4547):753-755. 14 May 1982. SFA 27(3)
[Dep. Biol., McGill Univ., 1205 Ave. Docteur Penfield, Montreal, PQ H3A 1B1, Canada] In the laboratory, fertilization rates achieved by male lemon tetras decline with spawning frequency. Even when the number of females is not limited, males can produce only four times as many offspring as females. Females show a preference for males that have not recently spawned as opposed to those that have. The cost of producing sufficient sperm to maximize fertilization rates may therefore reduce the intensity of sexual selection in this polygamous fish species.

82-001633 Sargent, R. C. SEXUAL SELECTION AND REPRODUCTIVE EFFORT IN THE THREESPINE STICKLEBACK, *GASTEROSTEUS ACULEATUS*. *Ph.D. dissertation, State Univ. N.Y. (Stony Brook)* 97p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(12):4672. June 1982. SFA 27(3)

82-001634 Swain, A. THE MIGRATIONS OF SALMON (*SALMO SALAR* L.) FROM THREE RIVERS ENTERING THE SEVERN ESTUARY. *J. Cons. Cons. Int. Explor. Mer* 40(1):76-80. Feb. 1982. SFA 27(3)
[Salmon Freshwater Fish. Lab., Whitehall Place East, London SW1A 2HH, England] Over a 7-year period more than 50,000 smolts were tagged in the Rivers Usk, Wye, and Severn. A total of 228 of these fish was subsequently recaptured: 19 were taken at West Greenland; 3 were taken in British waters away from the Bristol Channel; and a further 100 fish were taken in tidal waters in the Severn estuary and Bristol Channel area. Of the remaining 106 salmon recaptured above tidal limits in home waters, 97(92%) were in their parent rivers, while 9(8%) had strayed to the freshwater reaches of other rivers.

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC.

82-001635 Bracken, B. E. SABLEFISH (*ANOPLOPOMA FIMBRIA*) MIGRATION IN THE GULF OF ALASKA BASED ON GULF-WIDE TAG RECOVERIES, 1973-1981. *Alaska Dep. Fish Game Inf. Leafl.* No. 199. iv + 24p. Apr. 1982. SFA 27(3)
[Alaska Dep. Fish Game, Div. Commer. Fish., P.O. Box 667, Petersburg 99833]

82-001636 Brown, L. and J. F. Downhower. SUMMER MOVEMENTS OF MOTTLED SCULPINS, *COTTUS BAIRDI* (PISCES: COTTIDAE). *Copeia* 1982(2):450-453. 28 May 1982. SFA 27(3)
[Dep. Biol., George Mason Univ., Fairfax, VA 22030]

82-001637 Hartman, G. F.; B. C. Andersen and J. C. Scrivener. SEAWARD MOVEMENT OF COHO SALMON (*ONCORHYNCHUS KISUTCH*) FRY IN CARNATION CREEK, AN UNSTABLE COASTAL STREAM IN BRITISH COLUMBIA. *Can. J. Fish. Aquatic Sci.* 39(4):588-597. Apr. 1982. In English with French summ. SFA 27(3)
[Dep. Fish. Oceans, Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

82-001638 Lenarz, W. H. MOVEMENTS OF ROCKFISH AND THEIR IMPLICATIONS FOR STOCK ASSESSMENT AND MANAGEMENT. *Proc. Annu. Conf. West. Assoc. Fish Wild. Agencies* 61:27. 1981. Abstract only. SFA 27(3)

82-001639 Matsushita, K.; M. Shimizu and Y. Nose. MICRO-DISTRIBUTION OF ANCHOVY EGGS AND LARVAE IN SAGAMI BAY. *Bull. Jpn. Soc. Sci. Fish.* 48(3):355-362. Mar. 1982. SFA 27(3)
[Dep. Fish., Fac. Agric., Univ. Tokyo, 1-1, Yayoi-1, Bunkyo, Tokyo 113, Japan]

82-001640 Mayama, H.; M. Kato; J. Seki and I. Shimizu. [STUDIES ON THE CHUM SALMON RELEASED IN THE ISHIKARI RIVER SYSTEM - I. ON THE SEAWARD MIGRATION AND INSHORE DISTRIBUTIONS OF LIBERATED FRY IN 1979.] *Sci. Rep. Hokkaido Salmon Hatchery* No. 36. p. 1-17. Mar. 1982. In Japanese with English summ. SFA 27(3)
[Hokkaido Salmon Hatchery, Nakanoshima, Toyohiraku, Sapporo, Hokkaido, Japan]

82-001641 Thorne, R. E. STUDIES OF JUVENILE SALMON DISTRIBUTION AND BEHAVIOR IN AN ESTUARINE ENVIRONMENT. *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:21-26. 1981. SFA 27(3)
[Fish. Res. Unit, Univ. Wash., Seattle]

FOODS/FEEDING

82-001642 Angermeier, P. L. RESOURCE SEASONALITY AND FISH DIETS IN AN ILLINOIS STREAM. *Environ. Biol. Fishes* 7(3):251-264. 1 June 1982. SFA 27(3)
[Dep. Ecol. Ethol. Evol., Univ. Ill., 606 E. Healey, Champaign 61820]

FOODS/FEEDING (CONTINUED)

82-001643 Ashton, C. E. THE RESPONSE OF PINFISH (*LAGODON RHOMBOIDES*) TO CRYPTIC AND NON-CRYPTIC FLOUNDER (*PARALICHTHYS ALBIGUTTA*). *M.S. thesis, Univ. West. Fla.* 54p. 1980. From Masters Abstr. 20(2):130. June 1982. SFA 27(3)

Observations made on the feeding behavior of *Paralichthys albigutta* indicated that this flounder utilizes an "ambush" method of prey capture while preying on pinfish. To further examine this predator-prey interaction, pinfish were exposed to substrate (i.e., shade) adapted and non-adapted flounder and flounder models. Pinfish avoided models, but not live flounder, that contrasted with the substrate in a directional (180 degrees opposite the models) and distance (distance from the model) predicted manner. Further analysis of live flounder data indicated that pinfish avoided the head area of live flounder that contrast with the shade of the substrate. The study suggests that pinfish may be unable to detect and avoid cryptically shaded flounder in the field, but it is not clear whether this indicates lack of experience with flounder or inability to perceive cryptically shaded flounder.

82-001644 Bartell, S. M. INFLUENCE OF PREY ABUNDANCE ON SIZE-SELECTIVE PREDATION BY BLUEGILLS. *Trans. Am. Fish. Soc.* 111(4):453-461. July 1982. SFA 27(3)

[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830]

82-001645 Barton, M. G. INTERTIDAL VERTICAL DISTRIBUTION AND DIETS OF FIVE SPECIES OF CENTRAL CALIFORNIA STICHAEOID FISHES. *Calif. Fish Game* 68(3):174-182. July 1982. SFA 27(3)

[Div. Sci. Math., Centre Coll. Ky., Danville 40422]

82-001646 Białokoz, W. and T. Kryzywosz. FEEDING INTENSITY OF SILVER CARP (*HYPOPHTHALMICHTHYS MOLITRIX* VAL.) FROM THE PAPROTECKIE LAKE IN THE ANNUAL CYCLE. *Ekol. Pol.* 29(1):53-61. 1981. SFA 27(3)

[Lake Fish. Stn., Inland Fish. Inst., Rajska 2, 11-500 Giżycko, Poland] The amounts of food consumed by silver carp introduced to eutrophic Paproteckie Lake were investigated. The period of food passage, diurnal and periodical food rations, fish increments and feeding coefficients were determined. Annual food consumption was estimated as 8.8 kg, 90% of which was in the three warmest months in the year. Weight increase of fish approximated the average one for the region. Feeding coefficient was about 19, fluctuating between 7.9 and 24.6.

82-001647 Britton, R. H. and M. E. Moser. SIZE SPECIFIC PREDATION BY HERONS AND ITS EFFECT ON THE SEX-RATIO OF NATURAL POPULATIONS OF THE MOSQUITO FISH *GAMBUSIA AFFINIS* BAIRD AND GIRARD. *Oecologia (Berl.)* 53(2):146-151. May 1982. SFA 27(3)

[Stn. Biol., Tour Valat, Le Sambuc, F-13200 Arles, France]

82-001648 Cockran, P. A. and I. R. Adelman. SEASONAL ASPECTS OF DAILY RATION AND DIET OF LARGEMOUTH BASS, *MICROPTERUS SALMOIDES*, WITH AN EVALUATION OF GASTRIC EVACUATION RATES. *Environ. Biol. Fishes* 7(3):265-275. 1 June 1982. SFA 27(3)

[Lab. Limnol., Univ. Wis., Madison 53706] Sample of stomach contents collected on 10 dates from May to October, 1978, were used to describe the diet and estimate the daily ration of subadult largemouth bass (primarily age-III fish) in Lake Rebecca, Minnesota. The method of Elliott & Persson (1978) was used to estimate daily ration. Data from sources in the literature

FOODS/FEEDING (CONTINUED)

82-001648 CONTINUED were used to quantify gastric evacuation, which was found to be adequately described by an exponential decay model. The exponent of gastric evacuation increased exponentially with temperature. Seasonal changes in the diet with respect to composition, distribution of food among stomachs, and food particle size were reflected in the seasonal pattern of growth. Weight gain and the formation of scale annuli did not occur until the diet shifted from large bluegills and insects to age-0 largemouth bass and bluegills. Estimates of daily ration ranged from almost zero in mid-May and early June to over 5% in late August. The use of median weights of stomach contents was found to yield more meaningful estimates of the daily rations of individual bass than those based on means. Estimates based on medians were consistent with the observed pattern of growth and with information on maintenance rations and satiation levels. A growth-limiting lack of suitably-sized forage fish apparently occurred in the early part of the growing season.

82-001649 Du Buit, M. H. ESSAI D'ÉVALUATION DE LA PRÉDATION DE QUELQUES TÉLÉOSTÉENS EN MER CELTIQUE. [EVALUATION OF PREDATION OF SOME TELEOSTS IN THE CELTIC SEA.] *J. Cons. Cons. Int. Explor. Mer* 40(1):37-46. Feb. 1982. SFA 27(3)

[Cent. Natl. Rech. Sci., Lab. Biol. Mar., 29 182 Concarneau, France] Predation by six teleosts (hake, haddock, pollack, whiting, cod, and megrim) in two zones of the Celtic Sea was assessed by a method based on the composition and weight of their stomach contents and the commercial landings. Annual landings of 67,000 tonnes are equivalent to a consumption of 166,000 tonnes of prey, and four species--blue whiting, Norway pout, poor cod, and sprat--accounted for 81% of the total.

82-001650 Emmett, R. L.; W. D. Muir and R. D. Pettit. DEVICE FOR INJECTING PRESERVATIVE INTO THE STOMACH OF FISH. *Prog. Fish-Cult.* 44(2):107-108. Apr. 1982. SFA 27(3)

[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

82-001651 Fausch, K. D. COMPETITION AMONG JUVENILES OF COHO SALMON, BROOK AND BROWN TROUT FOR RESOURCES IN STREAMS. *Ph.D. dissertation, Mich. State Univ.* 111p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(12):4669. June 1982. SFA 27(3)

Results indicate that age-0 brook and brown trout could not gain advantageous stream positions in the face of competition from age-0 coho salmon even if the coho were of equal size. In streams where they occur together, juveniles of coho are larger than those of brook and brown trout, which gives the coho an even greater competitive advantage. Instream cover that affords visual isolation may somewhat ameliorate the competitive disadvantage of brook and brown trout in Great Lakes tributaries where coho salmon reproduce.--From abstr.

82-001652 Garman, G. C. and L. A. Nielsen. PISCIVORITY BY STOCKED BROWN TROUT (*SALMO TRUTTA*) AND ITS IMPACT ON THE NONGAME FISH COMMUNITY OF BOTTOM CREEK, VIRGINIA. *Can. J. Fish. Aquatic Sci.* 39(6):862-869. June 1982. In English with French summ. SFA 27(3)

[Me. Coop. Fish. Res. Unit, Univ. Me., Orono 04473

82-001653 Gilliland, E. R.; C. W. Kleinholz and M. D. Clady. THE EFFICIENCY OF REMOVING FOOD ITEMS FROM FISH WITH GLASS TUBES. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:95-100. 1981[1982]. SFA 27(3)

FOODS/FEEDING (CONTINUED)

82-001653 CONTINUED
[Okla. Coop. Fish. Res. Unit, Okla. State Univ., Stillwater 74078] The stomach contents of live striped bass (*Morone saxatilis*), white bass (*M. chrysops*), striped bass x white bass hybrids, largemouth bass (*Micropterus salmoides*), and white crappie (*Pomoxis annularis*) were examined and removed using glass tubes. This technique removed more than 90% of the food by weight or volume from all species except white crappie. We removed shad (*Dorosoma* spp.), sunfishes (*Lepomis* spp.), inland silversides (*Menidia beryllina*), crayfish, benthic invertebrates, zooplankton, and adult and larval insects from the species studied. This technique is fast, efficient, and usually does not require sacrificing the fish.

82-001654 Hogue, E. W. SEASONAL CHANGE IN THE ABUNDANCE AND SPATIAL DISTRIBUTION OF A MEIOBENTHIC ASSEMBLAGE ON THE OPEN OREGON COAST AND ITS RELATIONSHIP TO THE DIET OF O-AGE FLATFISHES. *Ph.D. dissertation, Oreg. State Univ.* 132p. 1982. From Diss. Abstr. Int. B Sci. Eng. 42(10):3913. Apr. 1982. SFA 27(3)

82-001655 Irvine, J. R. and T. G. Northcote. SIGNIFICANCE OF SEQUENTIAL FEEDING PATTERNS OF JUVENILE RAINBOW TROUT IN A LARGE LAKE-FED RIVER. *Trans. Am. Fish. Soc.* 111(4):446-452. July 1982. SFA 27(3)
[Dep. Zool., Univ. Otago, Dunedin, New Zealand]

82-001656 Lucas, J. R. FEEDING ECOLOGY OF THE GULF SILVERSIDE, *MENIDIA PENINSULAE*, NEAR CRYSTAL RIVER, FLORIDA, WITH NOTES ON ITS LIFE HISTORY. *Estuaries* 5(2):138-144. June 1982. SFA 27(3)
[Dep. Zool., Univ. Fla., Gainesville 32611] Feeding habits of *Menidia peninsulae* were analyzed monthly over a one year period and compared to planktonic prey available at the capture site. Three feeding stages were found: (1) In early spring, young-of-the-year fed on tychoplankton and detritus. (2) From late spring through winter, *M. peninsulae* preyed selectively on calanoid copepods and cypris larvae. (3) Gravid *M. peninsulae* fed primarily on amphipods and larval silversides. In the Crystal River area, *M. peninsulae* reproduce in early spring. Silversides apparently migrate from the higher salinity bays to the lower salinity marshes in the summer, and then move back into the bays in fall.

82-001657 McComas, S. R. and R. W. Drenner. SPECIES REPLACEMENT IN A RESERVOIR FISH COMMUNITY: SILVERSIDE FEEDING MECHANICS AND COMPETITION. *Can. J. Fish Aquatic Sci.* 39(6):815-821. June 1982. In English with French summ. SFA 27(3)
[WAPORA Inc., 35 East Wacker Dr., Suite 490, Chicago, IL 60601]

82-001658 Moore, J. A. and G. H. Winters. GROWTH PATTERNS IN A NEWFOUNDLAND ATLANTIC HERRING (*CLUPEA HARENGUS HARENGUS*) STOCK. *Can. J. Fish. Aquatic Sci.* 39(3):454-461. Mar. 1982. In English with French summ. SFA 27(3)
[Dep. Fish Oceans, P.O. Box 5667, St. Johns, NF A1C 5X1, Canada]

82-001659 Pearre, S., Jr. ESTIMATING PREY PREFERENCE BY PREDATORS: USES OF VARIOUS INDICES, AND A PROPOSAL OF ANOTHER BASED ON $\chi^2$. *Can. J. Fish. Aquatic Sci.* 39(6):914-923. June 1982. In English with French summ. SFA

FOODS/FEEDING (CONTINUED)

82-001659 CONTINUED 27(3)
[Dep. Oceanogr., Dalhousie Univ., Halifax, NS B3H 4J1, Canada]

82-001660 Power, M. E. THE GRAZING ECOLOGY OF ARMORED CATFISH (LORICARIIDAE) IN A PANAMANIAN STREAM. *Ph.D. dissertation, Univ. Wash.* 284p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(12):4709. June 1982. SFA 27(3)

82-001661 Ringler, N. H. and J. H. Johnson. DIET COMPOSITION AND DIEL FEEDING PERIODICITY OF SOME FISHES IN THE ST. LAWRENCE RIVER. *N.Y. Fish Game J.* 29(1):65-74. Jan. 1982. SFA 27(3)
[Sch. Biol. Chem. Ecol., State Univ. N.Y. Coll. Environ. Sci. For., NY] The diets of 901 fish representing nine species, collected in the St. Lawrence River at Cape Vincent and Massena from July to October 1976, were examined. Fish were gill netted at 4-hour intervals at depths of 5 and 10 meters. Amphipods appeared to be a major prey of many adult fish (e.g., yellow perch, rock bass, alewife, white sucker and brown bullhead). Cladocerans were the most important zooplankton taken by planktivorous fishes (i.e., alewife and gizzard shad). Invertebrate eggs represented nearly 67 per cent of the diet of yellow perch in July. Feeding periodicity of yellow perch and rock bass was similar to that reported for a lake in the Province of Ontario. However, diel patterns of yellow perch and alewife at a depth of 5 meters appeared to differ from those at 10 meters.

82-001662 Ross, J. L. FEEDING HABITS OF THE GRAY TILEFISH, *CAULOLATILUS MICROPS* (GOODE AND BEAN, 1878) FROM NORTH CAROLINA AND SOUTH CAROLINA WATERS. *Bull. Mar. Sci.* 32(2):448-454. Apr. 1982. SFA 27(3)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843]

82-001663 Savino, J. F. and R. A. Stein. PREDATOR-PREY INTERACTION BETWEEN LARGEMOUTH BASS AND BLUEGILLS AS INFLUENCED BY SIMULATED, SUBMERSED VEGETATION. *Trans. Am. Fish. Soc.* 111(3):255-266. May 1982. SFA 27(3)
[Ohio Coop. Fish. Res. Unit, Ohio State Univ., Columbus 43210]

82-001664 Savitz, J. and J. Janssen. UTILIZATION OF GREEN SUNFISH AND BLUEGILLS BY LARGEMOUTH BASS: INFLUENCE OF INGESTION TIME. *Trans. Am. Fish. Soc.* 111(4):462-464. July 1982. SFA 27(3)
[Biol. Dep., Loyola Univ. Chicago, Chicago, IL 60626]

82-001665 Savitz, J. TROPHIC DIVERSITY AND FOOD PARTITIONING AMONG FISHES ASSOCIATED WITH AQUATIC MACROPHYTE PATCHES. *Trans. Ill. State Acad. Sci.* 74(3-4):111-120. 1981. SFA 27(3)
[Biol. Dep., Loyola Univ. Chicago, 6525 N. Sheridan Rd., Chicago, IL 60626] Contents of 573 stomachs were examined for five fish species (largemouth bass, yellow perch, warmouth, bluegill, and pumpkinseed) collected among macrophyte patches. Trophic diversities and food overlap coefficients were calculated so that competitive interactions could be identified for further study. The largemouth bass, the bluegill, and the pumpkinseed were classed as food specialists and had low food overlap coefficients between them. There appeared to be little competition between the largemouth bass and either the bluegill or the pumpkinseed, but some competition between the bluegill and pumpkinseed may have existed for caddisflies. The yellow perch and the warmouth had high food overlap coefficients with each other as well as with other species and both exhibited a large trophic diversity. They were classified as food generalists.

FOODS/FEEDING (CONTINUED)

82-001666 Schmidt, D. and W. J. O'Brian. PLANKTIVOROUS FEEDING ECOLOGY OF ARCTIC GRAYLING (*THYMALLUS ARCTICUS*). *Can. J. Fish. Aquatic Sci.* 39(3):475-482. Mar. 1982. In English with French summ. SFA 27(3)
[L.G.L. Alaska Res. Assoc., P.O. Box 80607, Fairbanks 98708]

82-001667 Sibbing, F. A. PHARYNGEAL MASTICATION AND FOOD TRANSPORT IN THE CARP (*CYPRINUS CARPIO* L.): A CINERADIOGRAPHIC AND ELECTROMYOGRAPHIC STUDY. *J. Morphol.* 172(2):223-258. May 1982. SFA 27(3)
[Exp. Anim. Morphol. Cell Biol., Agric. Univ., Marijkeweg 40, 6709 PG Wageningen, Netherlands]

82-001668 Stillwell, C. E. and N. E. Kohler. FOOD, FEEDING HABITS, AND ESTIMATES OF DAILY RATION OF THE SHORTFIN MAKO (*ISURUS OXYRINCHUS*) IN THE NORTHWEST ATLANTIC. *Can. J. Fish. Aquatic Sci.* 39(3):407-414. Mar. 1982. In English with French summ. SFA 27(3)
[NMFS, Narragansett Lab., Narragansett, RI 02882]

82-001669 Strauss, R. E. INFLUENCE OF REPLICATED SUBSAMPLES AND SUBSAMPLE HETEROGENEITY ON THE LINEAR INDEX OF FOOD SELECTION. *Trans. Am. Fish. Soc.* 111(4):517-522. July 1982. SFA 27(3)
[Div. Fishes, Mus. Zool., Univ. Mich., Ann Arbor 48109]

82-001670 Tallman, R. F. and J. H. Gee. INTRASPECIFIC RESOURCE PARTITIONING IN A HEADWATERS STREAM FISH, THE PEARL DACE *SEMOTILUS MARGARITA* (CYPRINIDAE). *Environ. Biol. Fishes* 7(3):243-249. 1 June 1982. SFA 27(3)
[Dep. Zool., Univ. Manitoba, Winnipeg, MB R3T 2N2, Canada] Pearl dace, *Semotilus margarita*, are common in slow-moving channels and pools of the headwaters of the Brokenhead River. From May to September age groups 0, 1 and 2+ were partially segregated in space based on water depth with age 0 occupying shallow pools and shallow channels. Age 1 were abundant in shallow pools and deep channels while age 2+ occurred in deep channels and deep pools. In November all age groups coexisted in deep pools. Pearl dace are omnivorous consuming invertebrates, plant material, and detritus. From May to September age groups 0 and 1 consumed mainly terrestrial invertebrates (Diptera, Hymenoptera, Thysanoptera) but age 1 consumed more detritus than age 0. Age 2+ consumed mainly aquatic Diptera larvae. Although all ages consumed aquatic insects almost exclusively in November differences in diet between age groups still existed. Younger fish fed higher in the water column than older fish. Intraspecific resource partitioning of food and space occurs between age groups and this combined with the omnivorous diet is highly adaptive to the headwaters of streams.

82-001671 Weisberg, S. B. FOOD AVAILABILITY AND UTILIZATION BY THE MUMMICHOG, *FUNDULUS HETEROCLITUS* (L.). *Ph.D. dissertation, Univ. Del.* 118p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(11):4295. May 1982. SFA 27(3)

82-001672 Wright, D. E. and A. Eastcott. OPERANT CONDITIONING OF FEEDING BEHAVIOUR AND PATTERNS OF FEEDING IN THICK LIPPED MULLET, *CRENIMUGIL LABROSUS* (RISSO) AND COMMON CARP, *CYPRINUS CARPIO* (L.). *J. Fish Biol.* 20(6):625-634. June 1982. SFA 27(3)
[Dep. Biol. Sci., Plymouth Polytech., Drake Circus, Plymouth, Devon, England] Groups of carp and thick lipped mullet quickly learned to operate an

FOODS/FEEDING (CONTINUED)

82-001672 CONTINUED underwater trigger for food reward. Single mullet also learned this operant response but single carp did not. Groups of mullet exhibited a higher rate of responding than groups of carp. Mullet appeared to feed in bouts, whereas carp fed randomly during the learning trials. Both species adapted well to six days continuous demand feeding. Grouped and single mullet decreased their feeding at night but carp did not show a diurnal feeding pattern. Feeding responses were found not to be sequences of random events and response rates over the six days were higher in carp than in mullet. In both species, individual fish within a group operated the trigger significantly more often than other fish but all fish took food and gained weight.

AGE AND GROWTH

82-001673 Allen, J. R. M. and R. J. Wootton. THE EFFECT OF RATION AND TEMPERATURE ON THE GROWTH OF THE THREE-SPINED STICKLEBACK, *GASTEROSTEUS ACULEATUS* L. *J. Fish Biol.* 20(4):409-422. Apr. 1982. SFA 27(3)
[Dep. Zool., Univ. Coll. Wales, Aberystwyth, Dyfed SY23 3DA, Wales]

82-001674 Arawomo, G. A. O. THE AGE AND GROWTH OF JUVENILE BROWN TROUT IN LOCH LEVEN, KINROSS, SCOTLAND. *Arch. Hydrobiol.* 93(4):466-483. 1982. SFA 27(3)
[Dep. Zool., Univ. Ife, Ille-Ife, Nigeria] The age and growth of juvenile trout in Loch Leven were determined from the fish scale studies. Of the 363 specimens studied among the loch trout, 55.9% were found to be 1-migrants, 37.2% and 6.9% were found to be 2- and 3-migrants respectively. Growth in length and weight differed between 1-, 2- and 3-migrants. Fast growth in Loch Leven feeder streams was responsible for the high proportion of early migrants of juvenile trout into the loch. All migrant groups showed a faster growth during their first loch year. Compared with other lochs, growth of juvenile trout in Loch Leven was good and this was linked with the high productivity of the loch and the area of loch habitat relative to that of nursery stream habitat.

82-001675 Carlander, K. D. STANDARD INTERCEPTS FOR CALCULATING LENGTHS FROM SCALE MEASUREMENTS FOR SOME CENTRARCHID AND PERCID FISHES. *Trans. Am. Fish. Soc.* 111(3):332-336. May 1982. SFA 27(3)
[Dep. Anim. Ecol., Iowa State Univ., Ames 50011]

82-001676 Collins, B. W. GROWTH OF ADULT STRIPED BASS IN THE SACRAMENTO-SAN JOAQUIN ESTUARY. *Calif. Fish Game* 68(3):146-159. July 1982. SFA 27(3)
[Calif. Dep. Fish Game, Bay-Delta Fish. Proj., 4001 N. Wilson Way, Stockton 95205] Adult striped bass, *Morone saxatilis*, growth in the Sacramento-San Joaqin Estuary was described well by the von Bertalanffy growth equation. After age 3, females grew more rapidly than males and by age 6 they were as large as 7-yr-old males. The size bass attain as adults appeared to be affected by their growth rate as young-of-the-year. An average 2 cm decrease in adult mean length was associated with an 18% decrease in young bass growth rate commencing in 1970. Annual mean growth in 1971 was substantially higher than for any other year and was associated with abundant forage in San Francisco and San Pablo bays.

AGE AND GROWTH (CONTINUED)

82-001677 Ferraris, C. J., Jr. and E. O. Murdy. ASPECTS OF SEXUAL DIMORPHISM AND FEEDING IN *PETROSCIRTES VARIABILIS* CANTOR (OSTEICHTHYS: BLENNIIDAE). *Micronesica* 17(1-2):157-159. Dec. 1981. SFA 27(3)
[Dep. Ichthyol., Am. Mus. Nat. Hist., Central Park West at 79th St., New York, NY 10024]

82-001678 Fisher, J. E. and E. J. Peters. AGE AND GROWTH OF CHANNEL CATFISH (*ICTALURUS PUNCTATUS*) IN BUCKLEY CREEK RESERVOIR, JEFFERSON COUNTY, NEBRASKA. *Proc. Nebr. Acad. Sci. Affil. Soc.* 92:10. 1982. Abstract only. SFA 27(3)
[Dep. For. Fish. Wildl., Inst. Agric. Nat. Resour., Univ. Nebr., Lincoln 68583-0819]

82-001679 Fraser, D. F. and R. D. Cerri. EXPERIMENTAL EVALUATION OF PREDATOR-PREY RELATIONSHIPS IN A PATCHY ENVIRONMENT: CONSEQUENCES FOR HABITAT USE PATTERNS IN MINNOWS. *Ecology* 63(2):307-313. Apr. 1982. SFA 27(3)
[Dep. Biol., Siena Coll., Loudonville, NY 12211] An experimental study, using the minnows *Semotilus atromaculatus* and *Rhinichthys atratulus*, was conducted in a seminatural artificial stream to evaluate the interaction of predator presence, habitat structural complexity, and time of day in determining habitat use patterns of prey. Predators were adult *S. atromaculatus*, while juveniles of both species were used as prey. Prey of both species actively avoid locations in the artificial stream that contain predators. However, structural complexity and time of day each have a mediating effect on the response of the prey fish to the presence of predators. While others have shown differential survivorship of prey, dependent upon structural complexity and time of day, this study shows how prey respond behaviorally to the presence of predators in habitat patches. They are most likely to enter those patches during daylight or when structure is present. In natural headwater streams prey fish are often found in patches of high predator density where prey density is often correlated with the degree of structural complexity. Our findings offer an explanation for this variability in relative abundances of predators and prey, by relating patch use by prey to habitat structural complexity and diel activity. Resulting implications for optimal foraging and guild organization are suggested.

82-001680 Hu, L. C. and P. R. Todd. AN IMPROVED TECHNIQUE FOR PREPARING EEL OTOLITHS FOR AGING. *N.Z. J. Mar. Freshwater Res.* 15(4):445-446. 1981. SFA 27(3)
[Fish. Res. Div., Mininst. Agric. Fish., Private Bag, Christchurch, New Zealand] The sagittal otoliths are removed from the eel and heated in a bunsen flame. Otolith fragments are embedded in clear silicone rubber sealant with the reading surface pressed against the surface of a microscope slide. The otoliths can then be read through the inverted slide under a binocular microscope using reflected light.

82-001681 Kain, D. C. A POST-IMPOUNDMENT STUDY OF AGE, GROWTH, AND CONDITION OF SELECTED ROUGH AND FORAGE FISHES IN CORDELL HULL RESERVOIR, TENNESSEE. *Tenn Tech J.* 16:64. 1981. Abstract only. SFA 27(3)
[Tenn. Tech Univ., Cookeville 38501]

82-001682 Lemly, A. D. and J. F. Dimmick. GROWTH OF YOUNG-OF-THE-YEAR AND YEARLING CENTRARCHIDS IN RELATION TO ZOOPLANKTON IN THE LITTORAL ZONE OF LAKES. *Copeia* 1982(2):305-321. 28 May 1982. SFA 27(3)
[Dep. Biol., Wake Forest Univ., Winston-Salem, NC 27109]

AGE AND GROWTH (CONTINUED)

82-001683 Mayberry, R. D. A COMPARATIVE AGE AND GROWTH STUDY OF WHITE BASS *MORONE CHRYSOPS* (RAFINESQUE) IN CENTER HILL RESERVOIR, TENNESSEE. *Tenn. Tech J.* 16:68. 1981. Abstract only. SFA 27(3)
[Tenn. Tech Univ., Cookeville 38501]

82-001684 Miller, S. J. and T. Storck. DAILY GROWTH RINGS IN OTOLITHS OF YOUNG-OF-THE-YEAR LARGEMOUTH BASS. *Trans. Am. Fish. Soc.* 111(4):527-530. July 1982. SFA 27(3)
[Ill. Nat. Hist. Surv. Lab., R.R. 1, Box 157, Sullivan 61951]

82-001685 Nelson, R. S. and C. S. Manooch III. GROWTH AND MORTALITY OF RED SNAPPERS IN THE WEST-CENTRAL ATLANTIC OCEAN AND NORTHERN GULF OF MEXICO. *Trans. Am. Fish. Soc.* 111(4):465-475. July 1982. SFA 27(3)
[NMFS, Beaufort Lab., Beaufort, NC 28516]

82-001686 Oduleye, S. O. GROWTH AND GROWTH REGULATION IN THE CICHLIDS. *Aquaculture* 27(3):301-306. Apr. 1982. SFA 27(3)
[Dep. Biol. Sci., Univ. Ilorin, P.M.B. 1515, Ilorin, Nigeria] Environmental factors do not vary widely all the year round in the topics where cichlids are endemic. Conventional methods of growth monitoring and age determination such as scale and otolith annual rings are thus not directly applicable to them. The methods which have been used in monitoring growth in the cichlids are discussed along with the limitations of such methods. Sexual precocity is a serious limitation to large-scale pond-raising of cichlids. Monosex culture and suppression of pituitary gonadotrophin production are two possible solutions to this problem.

82-001687 Papaconstantinou, C.; N. Tsimenidis and C. Daoulas. AGE, GROWTH AND REPRODUCTION OF RED MULLET (*MULLUS BARBATUS* L., 1758) IN THE GULFS OF SARONIKOS AND THERMAIKOS. *Thalassographica* 4(1):39-66. Aug. 1981. SFA 27(3)
[Inst. Oceanogr. Fish. Res., Athens, Greece] The age, growth and reproduction of red mullet (*Mullus barbatus*) in the Gulfs of Saronikos and Thermaikos during 1975-1978 were studied. The annual growth of males was estimated to be 11.7 mm in Saronikos and 10.0 mm in Thermaikos while the average annual increment for females was found to be 12.3 mm and 11.3 mm in Saronikos and Thermaikos Gulfs respectively. The red mullet appeared to present the smallest length growth as compared to that in all other Mediterranean areas. Males begin to mature right after the completion of the 1st annual ring while females after age two.

82-001688 Papst, M. H.; G. B. Ayles and S. Uraiwan. A MODEL FOR ESTIMATING THE GROWTH OF CULTURED RAINBOW TROUT (*SALMO GAIRDNERI* RICHARDSON). *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1088. iv + 10p. June 1982. In English with French summ. SFA 27(3)
[Dep. Fish. Oceans, Winnipeg, MB R3T 2N6, Canada]

82-001689 Peterman, R. M. NONLINEAR RELATION BETWEEN SMOLTS AND ADULTS IN BABINE LAKE SOCKEYE SALMON (*ONCORHYNCHUS NERKA*) AND IMPLICATIONS FOR OTHER SALMON POPULATIONS. *Can. J. Fish. Aquatic Sci.* 39(6):904-913. June 1982. In English with French summ. SFA 27(3)
[Dep. Biol. Sci. Nat. Resour. Manage. Prog., Simon Fraser Univ., Burnaby, BC V5A 1S6, Canada]

AGE AND GROWTH (CONTINUED)

82-001690 Prentice, J. A. and P. P. Durocher. LENGTH-WEIGHT RELATIONSHIPS AND AVERAGE GROWTH RATES FOR STRIPED, WHITE AND STRIPED X WHITE HYBRID BASS IN TEXAS. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:101-109. 1981[1982]. SFA 27(3)
[Tex. Parks Wildl. Dep., Austin 78744]

82-001691 Radtke, R. L. AGE RESOLUTION OF BILLFISHES (ISTIOPHORIDAE AND XIPHIIDAE). *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:58-74. 1981. SFA 27(3)
[Pacific Gamefish Found., P.O. Box 25115, Honolulu, HI 96825]

82-001692 Robertson, A. I. POPULATION DYNAMICS AND FEEDING ECOLOGY OF JUVENILE AUSTRALIAN SALMON (*ARRIPIS TRUTTA*) IN WESTERN PORT, VICTORIA. *Aust. J. Mar. Freshwater Res.* 33(2):369-375. 1982. SFA 27(3)
[Div. Fish. Res., CSIRO, P.O. Box 20, North Beach, W.A. 6020, Australia] Juveniles (0 + age group) of both subspecies of the Australian salmon were captured over eelgrass meadows in Western Port at various times between October 1974 and February 1976. The western subspeces and the eastern subspecies were present from August through April, and December through May, respectively. The western subspecies always fed on benthic-dwelling prey including fishes, crabs and shrimps, and the eastern subspecies fed on prey which inhabited the water column (crustacean larvae, insects and epitokous polychaetes) in December but switched to benthic-dwelling prey (fishes, small squid, benthic crustaceans and polychaetes) in May. The role of different gill-raker number and morphology in effecting dietary separation of the subspecies is unclear.

82-001693 Schaefer, W. F.; W. A. Swenson and R. A. Heckmann. AGE, GROWTH AND TOTAL MORTALITY OF RAINBOW SMELT IN WESTERN LAKE SUPERIOR. *Trans. Wis. Acad. Sci. Arts Lett.* 69:15-20. 1981. SFA 27(3)
[Dep. Zool., Brigham Young Univ., Provo, UT] Age and growth were determined for 962 rainbow smelt, *Osmerus mordax* (Mitchill), captured from western Lake Superior in 1976 and 1977. The body-scale relationship, based on total length (mm, L) and scale radius (mm, S) was $L = 74.3S + 1.2$. Smelt attained average lengths of 64, 126, 162, 184 and 203 mm at ages 1 through 5 respectively. The length-weight relationship based on total length (mm, L) and weight (g, W) was $\log_{10}W = 3.01 \log_{10}L - 5.351$. Backcalculated mean length at age was greater for females than males at ages 3-5. Mortality rate was estimated from a sample of 3050 smelt captured from western Lake Superior between 1973 and 1977. The overall annual total mortality rate was estimated at 57%. Mortality was 40% during the fourth growing season and 69% during the fifth growing season. The mortality rate of males was higher than females as reflected in a sex ratio for mature smelt of 2.37 females per male. Warmer temperature and high food availability in the Superior-Duluth harbor resulted in faster growth of young-of-the-year smelt than in the lake proper.

82-001694 Schiavone, A., Jr. AGE AND GROWTH OF BOWFIN IN BUTTERFIELD LAKE, NEW YORK. *N.Y. Fish Game J.* 29(1):107. Jan. 1982. SFA 27(3)
[N.Y. State Dep. Environ. Conserv., Watertown 13601]

82-001695 Schmitt, D. N. and W. A. Hubert. COMPARISON OF CLEITHRA AND SCALES FOR AGE AND GROWTH ANALYSIS OF YELLOW PERCH. *Prog. Fish-Cult.* 44(2):87-88. Apr. 1982. SFA 27(3)
[Iowa Coop. Fish. Res. Unit, Iowa State Univ., Ames 50011]

AGE AND GROWTH (CONTINUED)

82-001696 Smith, D. C. AGE AND GROWTH OF JACKASS MORWONG (*NEMADACTYLUS MACROPTERUS* BLOCH & SCHNEIDER) IN EASTERN AUSTRALIAN WATERS. *Aust. J. Mar. Freshwater Res.* 33(2):245-253. 1982. SFA 27(3)
[N.S.W. State Fish., P.O. Box N211, Grosvenor St., N.S.W. 2000, Australia] *N. macropterus*, landed at the port of Eden, were sampled from July 1976 to June 1979. Saggital otoliths were used for age determination. A hyaline and an opaque ring were found to be formed during winter and summer, respectively. The growth of adult *N. macropterus* was adequately described by the von Bertalanffy growth curve. Females ($K=0.13$, $L\infty=51.13$) were found to grow faster, and to a greater age, than males ($K=0.17$, $L\infty=45.50$). No significant difference between sexes was apparent in the length-weight relationships.

82-001697 Snelson, F. F., Jr. INDETERMINATE GROWTH IN MALES OF THE SAILFIN MOLLY, *POECILIA LATIPINNA*. *Copeia* 1982(2):296-304. 28 May 1982. SFA 27(3)
[Dep. Biol. Sci., Univ. Cent. Fla., Orlando 32816]

82-001698 Stone, W. B.; A. M. Narahara and W. L. Dovel. GIEMSA-STAINED SECTIONS OF PECTORAL FIN RAYS FOR DETERMINING THE AGE OF STURGEON. *N.Y. Fish Game J.* 29(1):103-105. Jan. 1982. SFA 27(3)
[N.Y. State Dep. Environ. Conserv., Wildl. Resour. Cent., Delmar 12054]

82-001699 Taubert, B. D. and J. A. Tranquilli. VERIFICATION OF THE FORMATION OF ANNULI IN OTOLITHS OF LARGEMOUTH BASS. *Trans. Am. Fish. Soc.* 111(4):531-534. July 1982. SFA 27(3)
[Ariz. Game Fish Dep., 2222 W. Guenway Rd., Phoenix 85023]

82-001700 Wandsvik, A. and M. Jobling. OVSERVATIONS ON GROWTH RATES OF ARCTIC CHARR, *SALVELINUS ALPINUS* (L.), REARED AT LOW TEMPERATURE. *J. Fish Biol.* 20(6):689-699. June 1982. SFA 27(3)
[M. Jobling: Inst. Fiskerifag, Univ. Tromsø, 9001 Tromsø, Norway] Food intake and growth of Arctic charr, *Salvelinus alpinus*, in fresh water was studied at three temperatures (2.9, 8.4 and 13.1°C). Best growth and highest food intake occurred at 13.1°C. The approximate chemical composition was dependent upon rearing temperature, fish reared at the highest temperature depositing large quantities of fat. Fish were later grown on in either fresh or salt water where two growth patterns were observed. In the light of published data for *Salvelinus* spp., it is suggested that the poorest growth was shown by fish which were incapable of complete adaptation to saltwater conditions.

82-001701 Wilson, C. A.; J. M. Dean and R. Radtke. AGE, GROWTH RATE AND FEEDING HABITS OF THE OYSTER TOADFISH, *OPSANUS TAU* (LINNAEUS) IN SOUTH CAROLINA. *J. Exp. Mar. Biol. Ecol.* 62(3):251-259. 1 July 1982. SFA 27(3)
[Belle W. Baruch Inst. Mar. Biol., Univ. S. C., Columbia 29208] Age, gonad state, gut content, and length-weight relationships were analyzed for oyster toadfish, *Opsanus tau* (Linnaeus), caught in 1978-1980 at Hilton Head, South Carolina, Toadfish Tournaments. Examination of the otoliths revealed ages that ranged from <1 to 8 yr, with a median age of 3 yr. Fish were sexually mature between years 2 to 7. Combined length-weight data provided a linear regression line value of $W_t = 4.9e^{0.017L}$; the age-weight relationship was $W_t = 26.5e^{0.52L}$. An unexploited fishery is suggested by the data.

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[Heilongjiang Fish. Res. Inst., Natl. Bur. Fish., Harbin, China]

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[British Columbia Proc. Mus., Victoria, BC V8V 1X4, Canada] Speckled dace, *Rhinichthys osculus*, are reported to be rare in Canada, but many juveniles plus a few adults were collected from many localities in the Kettle and Granby Rivers of British Columbia. Fecundity and preponderance of juveniles suggest adequate reproduction, however, adults were scarcely represented and captured in only a few habitats. Provided there are no major

GEOGRAPHICAL DISTRIBUTION, FISH SURVEYS, ETC. (CONTINUED)

82-001720 CONTINUED alterations of the Kettle River environment by man, speckled dace are not endangered in Canada. We suggest adoption of an index to rank our threatened species so that comparison of levels of "endangeredness" can be made to pinpoint Canadian fish species needing greatest protection.

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[N.C. Div. Mar. Fish., P.O. Box 769, Morehead City 28557]

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[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

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[N.Y. State Dep. Environ. Conserv., Stony Brook 11794]

ABUNDANCE, FACTORS OF; SURVIVAL AND MORTALITY

82-001741 Conover, D. O. SEASONAL MIGRATION, REPRODUCTIVE STRATEGY, AND ENVIRONMENTAL SEX DETERMINATION AND ITS ADAPTIVE SIGNIFICANCE IN THE ATLANTIC SILVERSIDE, *MENIDIA MENIDIA*. *Ph.D. dissertation, Univ. Mass.* 118p. 1982. From Diss. Abstr. Int. B Sci. Eng. 42(12):4705. June 1982. SFA 27(3)
Analyses of catch records of the inshore and offshore bottom trawl survey program of the National Marine Fisheries Service revealed that populations of *M. menidia* north of Cape Hatteras undergo an offshore migration in winter. Most collections were confined to the inner continental shelf within 50 km of the shoreline and occurred in waters less than 50 m deep. The winter movement and mortality patterns of *M. menidia* suggest a substantial net-export of biomass from salt marsh to offshore communities. Daily observations during high tide at a salt marsh in Salem Harbor, Massachusetts demonstrated that spawning was highly periodic, coincided with the occurrence of new and full moons, and was also highly correlated with tidal height. Spawing in the laboratory occurred every 1-3 days, rather than fortnightly, whether natural celestial cues were available (outdoor pools) or not (indoor aquaria). Mating was promiscuous and occurred in small groups of from 5-10 to several hundred fish. The reproductive ecology of *M. menidia* in Massachusetts differs from that in South Carolina in terms of timing, egg substrates, and mating behavior. Sex determination in *M. menidia* is under the control of both temperature and genotype during a specific period of larval development. Sex ratios of progeny from different females are highly variable and differ in degree of response to temperature. This demonstrates that sex ratio in fishes that normally have separate sexes can be influenced by the environment. The adaptive significance of temperature-dependent sex determination in *Menidia* appears to be related to the survivorship schedule, size-selective mortality, mating strategy, and differences in how the sexes invest resources in the production of gametes. Large individuals survive the winter in higher proportions than small individuals, regardless of sex, but large size is more important to increasing the fertility of females than males because ovarian weights are an increasing function of size while testicular weights are not. These findings are in agreement with the current theory concerning sex allocation and the evolution of environmental sex determination.

82-001742 Kawasaki, T. A COMPARATIVE LIFE HISTORICAL STUDY OF THE THREE HETEROSOMES IN SENDAI BAY. *Bull. Jpn. Soc. Sci. Fish.* 48(5):605-609. May 1982. SFA 27(3)
[Fac. Agric., Tohoku Univ., Sendai 980, Japan] Three heterosomes, stone flounder, plaice and dab are distributed over an almost common area on the continental shelf in Sendai Bay and feed on the common food, infauna organisms. Although the stock levels of the former two species have declined under the recent heavy fishing, conversely that of the latter has increased to a high level. These phenomena seem to result from the fact that while both stone flounder and plaice spawn in late autumn-winter, being long-lived, large-sized and low in intrinsic rate of natural increase $r_m$, and reveal a stable pattern of population change, dab spawns in late winter-spring, being short-lived, small-sized and high in $r_m$, and shows a variable pattern of fluctuation in recruitment.

ABUNDANCE, FACTORS OF; SURVIVAL AND MORTALITY (CONTINUED)

82-001743 Marshall, B. E. THE INFLUENCE OF RIVER FLOW ON PELAGIC SARDINE CATCHES IN LAKE KARIBA. *J. Fish Biol.* 20(4):465-469. Apr. 1982. SFA 27(3)
[Lake Kariba Fish. Res. Inst., P.O. Box 75, Kariba, Zimbabwe] The nutrient level of Lake Kariba is governed by the Zambezi river which provides about 70% of its water supply. Other tributaries are richer in nutrients and have an appreciable local effect. This is shown by the catches of *Limnothrissa miodon* which increase after strong flows in the Sanyati river. This is in contrast to natural lakes such as Lake Tanganyika and may be an important management factor in Lake Kariba and other man-made lakes. Possible periods of poor rainfall could thus reduce the *Limnothrissa* yield in Lake Kariba.

82-001744 Mills, C. A. FACTORS AFFECTING THE SURVIVAL OF DACE, *LEUCISCUS LEUCISCUS* (L.), IN THE EARLY POST-HATCHING PERIOD. *J. Fish Biol.* 20(6):645-655. June 1982. SFA 27(3)
[Freshwater Biol. Assoc., River Lab., East Stoke, Wareham, Dorset BH20 6BB, England] Young dace fry were stocked into nylon mesh cages at densities ranging from 0.044 to 7.230 $l^{-1}$, and the cages anchored in a backwater area where the fry gathered naturally. The fry began feeding on small organisms drifting into the cages 2-4 days after hatching. The growth rate of the fry was inversely proportional, and the death rate directly proportional, to initial density. Soon after the exhaustion of endogenous food reserves (as determined from unfed.fry), there was a period of massive mortality at the highest initial densities, probably due to starvation. After 20 weeks, the cages stocked at the two highest initial densities contained the lowest biomass of fry. Transfer of fry to cages with a larger mesh size produced increased growth and 46% survival over 20 weeks at the lowest initial density. These fry reached an overwintering length of 35.5 mm compared with 48.0 mm for naturally occurring fry.

82-001745 Paloheimo, J. E.; L. L. McDonald and S. A. Butler. ESTIMATION OF FISH MORTALITY. *Trans. Am. Fish. Soc.* 111(4):535-537. July 1982. SFA 27(3)
[Dep. Zool., Univ. Toronto, Toronto, ON M5S 1A1, Canada]

82-001746 Serns, S. L. INFLUENCE OF VARIOUS FACTORS ON DENSITY AND GROWTH OF AGE-0 WALLEYES IN ESCANABA LAKE, WISCONSIN, 1958-1980. *Trans. Am. Fish. Soc.* 111(3):299-306. May 1982. SFA 27(3)
[Wis. Dep. Nat. Resour., Box 440, Woodruff 54568]

82-001747 Toth, L. A.; D. R. Dudley; J. R. Karr and O. T. Gorman. NATURAL AND MAN-INDUCED VARIABILITY IN A SILVERJAW MINNOW (*ERICYMBA BUCCATA*) POPULATION. *Am. Midl. Nat.* 107(2):284-293. Apr. 1982. SFA 27(3)
[Dep. Ecol. Ethol. Evol., 606 E. Healey, Univ. Ill., Champaign 61820] During 8 years of fish sampling in an agricultural watershed, density of the silverjaw minnow *Ericymba buccata* fluctuated widely with a population outbreak in 1976 followed by a rapid decline. Accompanying these fluctuations were changes in population structure that were linked to differential mortality and variation in recruitment. Factors responsible for the demise of this species in the watershed included: severe droughts during 1976 and 1978; consecutive harsh winters in 1976-1977, 1977-1978 and 1978-1979; fish kills; and modified habitat conditions brought about by stream alterations.

82-001748 Wandsvik, A. and M. Jobling. OVERWINTERING MORTALITY OF MIGRATORY ARCTIC CHARR, *SALVELINUS ALPINUS*, (L.) REARED IN SALT WATER. *J. Fish Biol.* 20(6):701-706. June 1982. SFA 27(3)

ABUNDANCE, FACTORS OF; SURVIVAL AND MORTALITY (CONTINUED)

82-001748 CONTINUED
[M. Jobling: Inst. Fiskerifag, Univ. Tromsø, 9001 Tromsø, Norway] The mortality of Arctic charr, *Salvelinus alpinus*, previously grown-on in salt water during the summer months, was studied during the winter 1980-81. Mortality did not appear to be related to a 'critical size' but rather to rates of growth shown by the fish during the summer months. Mortality was high amongst the slow-growing fish. The results are discussed in relation to published data on the osmoregulatory capabilities of *Salvelinus* spp.

IDENTIFICATION, KEYS, CLASSIFICATION

82-001749 Beamish, R. J. *LAMPETRA MACROSTOMA*, A NEW SPECIES OF FRESHWATER PARASITIC LAMPREY FROM THE WEST COAST OF CANADA. *Can. J. Fish. Aquatic Sci.* 39(5):736-747. May 1982. In English with French summ. SFA 27(3)
[Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

82-001750 Branstetter, S. PROBLEMS ASSOCIATED WITH THE IDENTIFICATION AND SEPARATION OF THE SPINNER SHARK, *CARCHARHINUS BREVIPINNA*, AND THE BLACKTIP SHARK, *CARCHARHINUS LIMBATUS*. *Copeia* 1982(2):461-465. 28 May 1982. SFA 27(3)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843]

82-001751 Bussing, W. A. *ELACATINUS JANSSI*, A NEW GOBIID FISH FROM COSTA RICA. *Rev. Biol. Trop.* 29(2):251-256. Dec. 1981. In English with Spanish summ. SFA 27(3)
[Esc. Biol., Univ. Costa Rica, Costa Rica]

82-001752 Collette, B. B. TWO NEW SPECIES OF FRESHWATER HALFBEAKS (PISCES: HEMIRAMPHIDAE) OF THE GENUS *ZENARCHOPTERUS* FROM NEW GUINEA. *Copeia* 1982(2):265-276. 28 May 1982. SFA 27(3)
[Syst. Lab., NMFS, Natl. Mus. Nat. Hist., Washington, DC 20560]

82-001753 Dawson, C. E. and P. Fourmanoir. *MICROPHIS CRUENTUS*, A NEW DORYRHAMPHINE PIPEFISH (SYNGNATHIDAE) FROM NEW CALEDONIA. *Micronesica* 17(1-2):113-118. Dec. 1981. SFA 27(3)
[Gulf Coast Res. Lab. Mus., Ocean Springs, MS 39564]

82-001754 Dawson, C. E. REVIEW OF THE INDO-PACIFIC PIPEFISH GENUS *DORYRHAMPHUS* KAUP (PISCES: SYNGNATHIDAE), WITH DESCRIPTIONS OF A NEW SPECIES AND A NEW SUBSPECIES. *Ichthyol. Bull. J. L. B. Smith Inst. Ichthyol.* No. 44. 27p. Nov. 1981. SFA 27(3)
[Gulf Coast Res. Lab. Mus., Ocean Springs, MS 39564]

82-001755 Fernholm, B. *EPTATRETUS CARIBBEAUS*: A NEW SPECIES OF HAGFISH (MYXINIDAE) FROM THE CARIBBEAN. *Bull. Mar. Sci.* 32(2):434-438. Apr. 1982. SFA 27(3)
[Dep. Biol. Chem., Roskilde Univ., Box 260, DK-4000 Roskilde, Denmark]

IDENTIFICATION, KEYS, CLASSIFICATION (CONTINUED)

82-001756 Franssen, J. and G. Nibaruta. UTILISATION DE LA TECHNIQUE D'ÉLECTROPHORÈSE DANS LA SYSTÉMATIQUE DES POISSONS. [UTILIZATION OF ELECTROPHORETIC TECHNIQUES FOR THE SYSTEMATICS OF FISH.] *Hydrobiologia* 88(3):289-293. 9 Apr. 1982. In French with English summ. SFA 27(3)
[Lab. Ethol. Aquarium, Inst. Zool., Univ. Liège, Belgium] Using agar gel electrophoresis, the number and relative mobility of seric protein fractions has been determined for twelve species of fishes belonging to the Elasmobranchii, Dipnoi and Actinopterygii. The study of relative mobilities has shown both similitudes and divergences between some of the proteinograms. Immunoelectrophoretic cross tests using the twelve sera and five antisera have shown that these similitudes did not result from protein homology and thus agar gel electrophoresis could not be used to determine phylogenetic relationships between the species considered.

82-001757 Garrick, J. A. F. SHARKS OF THE GENUS *CARCHARHINUS*. *NOAA Tech. Rep. NMFS Circ.* 445. vii + 194p. May 1982. SFA 27(3)
[Dep. Zool., Victoria Univ. Wellington, Private Bag, Wellington, New Zealand]

82-001758 Heemstra, P. C. TAXONOMIC NOTES ON SOME TRIGLID AND PERISTEDIID FISHES (PISCES: SCORPAENIFORMES) FROM SOUTHERN AFRICA. *Copeia* 1982(2):291-295. 28 May 1982. SFA 27(3)
[JLB Smith Inst. Ichthyol., Rhodes Univ., Grahamstown, South Africa]

82-001759 Krupp, F. *GARRA TIBANICA GHORENSIS* SUBSP. NOV. (PISCES: CYPRINIDAE), AN AFRICAN ELEMENT IN THE CYPRINID FAUNA OF THE LEVANT. *Hydrobiologia* 88(3):319-324. 9 Apr. 1982. SFA 27(3)
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POLLUTION (CONTINUED)

82-001867 CONTINUED *forsteri*) and ca 2,930 p.p.m. (19 p.p.m. iron, pH 5.4) for juvenile school whiting (*Sillago bassensis*). Oxidising ferrous iron had an acute incipient lethal concentration of ca 6 p.p.m. to juvenile yellow-eye mullet on first exposure. Iron lost its toxic properties as soluble ferrous iron oxidised to insoluble, flocculent ferric iron. Juvenile yellow-eye mullet tolerated very brief (ca 60s) exposure to pH 2 but were rendered motionless for the period of exposure. For juvenile school whiting the values were pH 2.4 for ca 30s. Fish from a variety of species tended to avoid the cloud produced by the addition of ferrous iron to seawater when the iron concentration in the cloud was 0.5 p.p.m. Experiments with clouds produced by the addition of silica to seawater indicated that the avoidance behaviour was a visual phenomenon. Caution is advised in the extrapolation of the results of laboratory experimentation to the field situation.

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82-001887 Halter, F. and J. T. Thomas. RECOVERY OF DAMAGES BY STATES FOR FISH AND WILDLIFE LOSSES CAUSED BY POLLUTION. *Ecol. Law Q.* 10(1):5-35. 1982. SFA 27(3)
[Univ. Pa. Sch. Law, Philadelphia]

TOXICOLOGY; BIOASSAYS

82-001888 Addison, R. F.; M. E. Zinck; D. E. Willis and J. J. Wrench. INDUCTION OF HEPATIC MIXED FUNCTION OXIDASE ACTIVITY IN TROUT (*SALVELINUS FONTINALIS*) BY AROCLOR 1254 AND SOME AROMATIC HYDROCARBON PCB REPLACEMENTS. *Toxicol. Appl. Pharmacol.* 63(2):166-172. Apr. 1982. SFA 27(3)
[Mar. Ecol. Lab., Bedford Inst. Oceanogr., Dartmouth, NS B2Y 4A2, Canada]

82-001889 Amelung, M. AUSWIRKUNGEN GELÖSTER EISENVERBINDUNGEN AUF DIE EI- UND LARVALENTWICKLUNG VON *SALMO GAIRDNERI* (RICHARDSON). [EFFECTS OF DISSOLVED IRON COMPOUNDS ON DEVELOPING EGGS AND LARVAE OF

TOXICOLOGY; BIOASSAYS (CONTINUED)

82-001889 CONTINUED *SALMO GAIRDNERI* (RICHARDSON).] *Arch. Fischereiwiss.* 32(1-3):77-87. Apr. 1982. In German with English summ. SFA 27(3)
[Univ. Hamburg, Olbersweg 24, 2000 Hamburg 50, West Germany] An apparatus for continuously saturated water with dissolved iron salts is presented and effects of iron on developing eggs and larvae of the rainbow trout (*Salmo gairdneri*, Richardson) are studied. It could be shown that the embryogenesis is delayed at iron concentrations of 5.7 mg/l. No increased mortality however was found below 5.7 mg/l. Even at higher concentrations (11.8 mg/l) no increased mortality was observed when eggs have been activated with iron containing water. Larvae however died to 100% 3 days after hatching in concentrations of 1.3 mg/l. Morphometrical investigations could show a sublethal damage of newly-hatched larvae. They were significantly shorter when incubated at 5.7 mg/l.

82-001890 Amend, D. F.; B. A. Goven and D. G. Elliot. ETOMIDATE: EFFECTIVE DOSAGES FOR A NEW FISH ANESTHETIC. *Trans. Am. Fish. Soc.* 111(3):337-341. May 1982. SFA 27(3)
[Sch. Vet. Med., Dep. Med., Univ. Calif., Davis 95616]

82-001891 Andreasen, J. K. and N. E. Hall. TOXAPHENE RESISTANCE IN MOSQUITOFISH FROM THE RIO GRANDE VALLEY OF TEXAS. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:110. 1981[1982]. Abstract only. SFA 27(3)
[U.S. FWS, P.O. Box 2087, Victoria, TX 77902] Mosquitofish collected from an agricultural area of the Rio Grande Valley showed a 30-fold increased tolerance to toxaphene over mosquitofish not normally exposed to agricultural pesticides from the Aransas National Wildlife Refuge. The results show that the resistant fish, by bioaccumulation of toxaphene, may pose a hazard to predatory species of fish and wildlife.

82-001892 Baker, J. P. and C. L. Schofield. ALUMINUM TOXICITY TO FISH IN ACIDIC WATERS. *Water Air Soil Pollut.* 18(1-3):289-309. July, Aug., Sept. 1982. SFA 27(3)
[Sch. For. Environ. Stud., Duke Univ., Durham, NC 27706]

82-001893 Bellan, G. MANUAL OF METHODS IN AQUATIC ENVIRONMENT RESEARCH. *FAO Fish. Tech. Pap.* No. 208. vii + 31p. 1981. SFA 27(3)
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82-001894 Booth, J. H.; G. F. Jansz and G. F. Holeton. $Cl^-$,$K^+$, AND ACID-BASE BALANCE IN RAINBOW TROUT DURING EXPOSURE TO, AND RECOVERY FROM, SUBLETHAL ENVIRONMENTAL ACIDIFICATION. *Can. J. Zool.* 60(5):1123-1130. May 1982. In English with French summ. SFA 27(3)
[Dep. Zool., Univ. Toronto, Toronto, ON M5S 1A1, Canada]

82-001895 Brown, D. J. A. THE EFFECT OF pH AND CALCIUM ON FISH AND FISHERIES. *Water Air Soil Pollut.* 18(1-3):343-351. July, Aug., Sept. 1982. SFA 27(3)
[CERL Freshwater Biol. Unit, Midlands Reg. Sci. Serv. Dep., Ratcliffe-on-Soar, Nottingham, NG11 0EE, England] The combined effect of Ca and pH on fish and fisheries is considered for both laboratory and field studies. It can be seen that at concentrations less than 100 $\mu eq\ l^{-1}$, Ca can exert a significant influence on survival times of fish, and similarly in the field, the number of fishless lakes and the number of

TOXICOLOGY; BIOASSAYS (CONTINUED)

82-001895 CONTINUED fish species found in lakes are less dependent on $H^+$ concentration at low concentrations of Ca than at high Ca levels. The limited historical field data available suggest that alongside any increase there may have been in surface water acidity, Ca concentrations have also increased, and the latter may have offset to some extent the deleterious biological effects of this increased acidity. Nevertheless, details of seasonal and spatial variations in these important water quality factors will need to be considered before a full understanding of the response to adidity of a fishery can be reached.

82-001896 Brown, D. J. A. INFLUENCE OF CALCIUM ON THE SURVIVAL OF EGGS AND FRY OF BROWN TROUT (*SALMO TRUTTA*) AT pH 4.5. *Bull. Environ. Contam. Toxicol.* 28(6):664-668. June 1982. SFA 27(3)
[C.E.R.L. Freshwater Biol. Unit, Midlands Reg. Sci. Serv. Dep., Ratcliffe-on-Soar, Nottingham, NG11 0EE, England]

82-001897 Buckley, J. T.; M. Roch; J. A. McCarter; C. A. Rendell and A. T. Matheson. CHRONIC EXPOSURE OF COHO SALMON TO SUBLETHAL CONCENTRATIONS OF COPPER--I. EFFECT ON GROWTH, ON ACCUMULATION AND DISTRIBUTION OF COPPER, AND ON COPPER TOLERANCE. *Comp. Biochem. Physiol. C Comp. Pharmacol.* 72(1):15-19. 1982. SFA 27(3)
[Dep. Biochem. Microbiol., Univ. Victoria, Victoria, BC V8W 2Y2, Canada]

82-001898 Burgess, J. W. CHRONIC EXPOSURE TO CAFFEINE DURING EARLY DEVELOPMENT MODIFIES SPATIAL BEHAVIOR IN JUVENILE JEWEL FISH SCHOOLS. *Pharmacol. Biochem. Behav.* 17(1):137-140. July 1982. SFA 27(3)
[Mental Retardation Res.Cent., UCLA Sch. Med., 760 Westwood Plaza, Los Angeles, CA 90024] Thirty sibling African jewel fish (*Hemichromis bimaculatus*) were either chronically exposed to caffeine between 50 to 100 days of age (at a concentration of 14 mg/l) or reared without drug in a control environment. After caffeine was withdrawn, fish in each group were videotaped for 30 minutes while schooling in a large tank. From the video record, mean distances and coefficients of variation of spacing were computed for each fish and its 1st to 9th nearest neighbors in all observations. Spacing distances were nearly identical for the two groups, but the caffeine fish exhibited much more variability in their spacing behavior ($P<0.00001$). This study demonstrates an effect on behavior of moderate caffeine levels present throughout the early developmental period, and illustrates a quantitative method to test for such effects.

82-001899 Carmichael, G. J.; B. A. Simco and J. R. Tomasso. EFFECTS OF FORMALIN ON SURVIVAL AND PLASMA COTRICOSTEROID LEVELS IN CHANNEL CATFISH. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:5. 1981[1982]. Abstract only. SFA 27(3)
[Memphis State Univ., Memphis, TN]

82-001900 Dauble, D. D.; W. E. Fallon; R. H. Gray; R. M. Bean; J. B. States. POTENTIAL ECOLOGICAL EFFECTS OF A COAL LIQUID FROM THE SOLVENT REFINED COAL II PROCESS TO AQUATIC ORGANISMS. *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:262-264. 1981. SFA 27(3)
[Pac. Northwest Lab., Ecol. Sci. Dep., Richland, WA 99352]

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82-001901 DeGraeve, G. M.; R. G. Elder; D. C. Woods and H. L. Bergman. EFFECTS OF NAPHTHALENE AND BENZENE ON FATHEAD MINNOWS AND RAINBOW TROUT. *Arch. Environ. Contam. Toxicol.* 11(4):487-490. 1982. SFA 27(3)
[Montreal Eng. Co., Ltd., 500 Beaverbrook Ct., Fredericton, NB E3B 5X4, Canada]

82-001902 Devlin, E. W.; J. D. Brammer and R. L. Puyear. ACUTE TOXICITY OF TOLUENE TO THREE AGE GROUPS OF FATHEAD MINNOWS (*PIMEPHALES PROMELAS*). *Bull. Environ. Contam. Toxicol.* 29(1):12-17. July 1982. SFA 27(3)
[Dep. Zool., N. Dak. State Univ., Fargo 58105]

82-001903 Eisler, R. TRACE METAL CONCENTRATIONS IN MARINE ORGANISMS. *Pergamon Press, Elmsford, N.Y.* 696p. 1981. Available @ $120.00 from Pergamon Press, Fairview Park, Elmsford, NY 10523. SFA 27(3)

82-001904 Ewing, M. S.; S. A. Ewing and M. A. Zimmer. SUBLETHAL COPPER STRESS AND SUSCEPTIBILITY OF CHANNEL CATFISH TO EXPERIMENTAL INFECTIONS WITH *ICHTHYOPHTHIRIUS MULTIFILIIS*. *Bull. Environ. Contam. Toxicol.* 28(6):674-681. June 1982. SFA 27(3)
[Dep. Zool., Okla. State Univ., Stillwater 74078]

82-001905 Folmar, L. C. and H. O. Hodgins. EFFECTS OF AROCLOR 1254 AND NO. 2 FUEL OIL, SINGLY AND IN COMBINATION, ON PREDATOR-PREY INTERACTIONS IN COHO SALMON (*ONCORHYNCHUS KISUTCH*). *Bull. Environ. Contam. Toxicol.* 29(1):24-28. July 1982. SFA 27(3)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

82-001906 Freeman, H. C.; G. Sangalang and B. Flemming. THE SUBLETHAL EFFECTS OF A POLYCHLORNATED BIPHENYL (AROCLOR 1254) DIET ON THE ATLANTIC COD (*GADUS MORHUA*). *Sci. Total Environ.* 24(1):1-11. May 1982. SFA 27(3)
[Dep. Fish. Oceans, Halifax Lab., Halifax, NS B3J 2S7, Canada]

82-001907 Garofano, J. S. and H. I. Hirshfield. PERIPHERAL EFFECTS OF CADMIUM ON THE BLOOD AND HEAD KIDNEY IN THE BROWN BULLHEAD (*ICTALURUS NEBULOSUS*). *Bull. Environ. Contam. Toxicol.* 28(5):552-556. May 1982. SFA 27(3)
[Div. Nat. Sci. Math., Bergen Commun. Coll., Paramus, NJ 07652]

82-001908 Gerking, S. D. and R. M. Lee. SURVIVAL AND REPRODUCTION OF THE DESERT PUPFISH (*CYPRINODON N. NEVADENSIS*) AFTER ACCLIMATION TO ACID WATER. *J. Exp. Zool.* 220(3):269-275. 1 May 1982. SFA 27(3)
[Dep. Zool., Ariz. State Univ., Tempe 85281]

82-001909 Giles, M. A. and J. F. Klaverkamp. THE ACUTE TOXICITY OF VANADIUM AND COPPER TO EYED EGGS OF RAINBOW TROUT (*SALMO GAIRDNERI*). *Water Res.* 16(6):885-889. 1982. SFA 27(3)
[Dep. Fish. Oceans, Freshwater Inst., 501 University Crescent, Winnipeg, MB R3T 2N6, Canada] The effects of vanadium (25-595 mg $l^{-1}$) and of copper (0.03-4.78 mg $l^{-1}$) on embryonic survival and hatching of eyed

TOXICOLOGY; BIOASSAYS (CONTINUED)

82-001909 CONTINUED eggs of rainbow trout, *Salmo gairdneri*, were investigated. Copper was approx. 300-fold more toxic than vanadium (96-h $LC_{50}$=0.4 and 118 mg $l^{-1}$, respectively) but had little effect on the timing of hatch. Vanadium induced premature hatching of eyed eggs at concentrations from 44 to 595 mg $l^{-1}$. Concentrations of copper required to produce lethality in eyed eggs were similar to concentrations required to produce mortality in juveniles. Vanadium concentrations approx. 15 times higher were required to produce mortality in eyed eggs than in juveniles. Therefore, acute exposure of eyed rainbow trout eggs to vanadium is not a sensitive toxicity test for use in establishing water quality criteria or maximum acceptable toxicant concentrations.

82-001910 Goodman, L. R.; D. J. Hansen; C. S. Manning and L. F. Faas. EFFECTS OF KEPONE ON THE SHEEPSHEAD MINNOW IN AN ENTIRE LIFE-CYCLE TOXICITY TEST. *Arch. Environ. Contam. Toxicol.* 11(3):335-342. 1982. SFA 27(3)
[U.S. EPA, Environ. Res. Lab., Sabine Island, Gulf Breeze, FL 32561] A life-cycle toxicity test with the estuarine sheepshead minnow (*Cyprinodon variegatus*) and the insecticide Kepone (chlordecone) in seawater showed that the maximum acceptable toxicant concentration (MATC) lies between 0.074 and 0.12µgKepone/L, based on reduced standard length of progeny at 0.12µg/L and higher concentrations. The application factor range (MATC/96-hr LC50) for sheepshead minnows exposed continuously to Kepone is from 0.001 to 0.002. Other adverse effects of Kepone exposure were: External signs of poisoning in fish exposed to concentrations ≥0.074µg/L, fatty degeneration of the liver and histological evidence of vertebral damage in some fish exposed to 0.78µg/L, reduced growth of parental fish at 0.39 and 0.78µg/L, reduced fecundity and fertility of eggs at 0.78µg/L, and reduced survival of embryos produced by fish exposed to 0.78µg/L. Average bioconcentration factors (concentration in tissue÷average measured concentration in water) ranged from 2,600 for 21-day-old juveniles to 7,600 for adult males.

82-001911 Havas, M. and T. C. Hutchinson. AQUATIC INVERTEBRATES FROM THE SMOKING HILLS, N.W.T.: EFFECT OF pH AND METALS ON MORTALITY. *Can. J. Fish. Aquatic Sci.* 39(6):890-903. June 1982. In English with French summ. SFA 27(3)
[Ecol. Syst., Cornell Univ., Ithaca, NY 14853]

82-001912 Hilton, J. W. and D. G. Dixon. EFFECT OF INCREASED LIVER GLYCOGEN AND LIVER WEIGHT ON LIVER FUNCTION IN RAINBOW TROUT, *SALMO GAIRDNERI* RICHARDSON: RECOVERY FROM ANAESTHESIA AND PLASMA $^{35}$S-SULPHOBROMOPHTHALEIN CLEARANCE. *J. Fish Dis.* 5(3):185-195. May 1982. SFA 27(3)
[Dep. Nutr., Coll. Biol. Sci., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

82-001913 Huey, D. W. and T. L. Beitinger. METHEMOGLOBIN LEVELS IN CHANNEL CATFISH, *ICTALURUS PUNCTATUS*, EXPOSED TO NITRITE AND TRICAINE METHANESULFONATE. *Can. J. Fish. Aquatic Sci.* 39(4):643-645. Apr. 1982. In English with French summ. SFA 27(3)
[Dep. Biol. Sci., North Tex. State Univ., Denton 76203]

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82-001914 Kiceniuk, J. W.; R. A. Khan; M. Dawe and U. Williams. EXAMINATION OF INTERACTION OF TRYPANOSOME INFECTION AND CRUDE OIL EXPOSURE ON HEMATOLOGY OF THE LONGHORN SCULPIN (*MYOXOCEPHALUS OCTODECEMSPINOSUS*). *Bull. Environ. Contam. Toxicol.* 28(4):435-438. Apr. 1982. SFA 27(3)
[Dep. Fish. Oceans, P.O. Box 5667, St. John's, NF A1G 5X1, Canada]

82-001915 Kodama, M.; T. Ogata and K. Yamamori. HEMOLYSIS OF ERYTHROCYTES OF RAINBOW TROUT *SALMO GAIRDNERI* EXPOSED TO ZINC POLLUTED WATER. *Bull. Jpn. Soc. Sci. Fish.* 48(4):593. Apr. 1982. SFA 27(3)
[Sch. Fish. Sci., Kitasato Univ., Sanriku, Iwate 022-01, Japan]

82-001916 Laitinen, M.; M. Nieminen and E. Hietanen. THE EFFECT OF pH CHANGES OF WATER ON THE HEPATIC METABOLISM OF XENOBIOTICS IN FISH. *Acta Pharmacol. Toxicol.* 51(1):24-29. July 1982. SFA 27(3)
[Dep. Physiol., Univ. Kuopio, P.O. Box 138, SF-70101 Kuopio, Finland]

82-001917 Leatherland, J. F. and R. A. sonstegard. BIOACCUMULATION OF ORGANOCHLORINES BY YEARLING COHO SALMON (*ONCORHYNCHUS KISUTCH* WALBAUM) FED DIETS CONTAINING GREAT LAKES COHO SALMON, AND THE PATHOPHYSIOLOGICAL RESPONSES OF THE RECIPIENTS. *Comp. Biochem. Physiol. C Comp. Pharmacol.* 72(1):91-99. 1982. SFA 27(3)
[Dep. Zool., Coll. Biol. Sci., Univ. Guelph, Guelph, ON, Canada]

82-001918 Lesniak, J. A. and S. M. Ruby. HISTOLOGICAL AND QUANTITATIVE EFFECTS OF SUBLETHAL CYANIDE EXPOSURE ON OOCYTE DEVELOPMENT IN RAINBOW TROUT. *Arch. Environ. Contam. Toxicol.* 11(3):343-352. 1982. SFA 27(3)
[Dep. Biol. Sci., Sir George Williams Campus, Concordia Univ., Montreal, PQ H3G 1M8, Canada]

82-001919 LeValley, M. J. ACUTE TOXICITY OF IODINE TO CHANNEL CATFISH (*ICTALURUS PUNCTATUS*). *Bull. Environ. Contam. Toxicol.* 29(1):7-11. July 1982. SFA 27(3)
[Div. Biol., Kans. State Univ., Manhatten 66506]

82-001920 Limsuwan, C. EVALUATION OF ETOMIDATE AS A FISH ANESTHETIC. *Ph.D. dissertation, Auburn Univ.* 142p. 1981. From Diss. Abst. Int. B Sci. Eng. 42(10):3889. Apr. 1982. SFA 27(3) Etomidate was an effective anesthetic on channel catfish (*Ictalurus punctatus*), golden shiners (*Notemigonus crysoleucas*), and bluegills (*Lepomis macrochirus*). In channel catfish and golden shiners the safety margin (LC50/EC50) for etomidate was 7.6 to 4.0 with exposure of 10 to 80 minutes. The 24-hour LC50 ranged from 0.59 to 2.73 mg/1 and toxicity was similar for longer exposure. Water pH and hardness had little effect on toxicity, but toxicity was reduced, anesthesia was more rapid and recovery was quicker at higher temperature. Anesthesia was safely achieved at 2 to 4 mg/1 for approximately 30 minutes. Sedation was produced within 15 minutes and maintained for 6 hours at 0.2 to 0.6 mg/1. Etomidate at 2mg/1 significantly increased hematocrit, hemoglobin, and total erythrocyte counts, and decreased mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration after 30 minutes of anesthesia. Prolonged exposure to etomidate 0.6mg/1 for 96 hours significantly increased plasma glucose and decreased plasma protein concentrations. Etomidate at 4mg/1 significantly increased hematocrit and hemoglobin values. Channel catfish anesthetized with 2 mg/1 etomidate had hematocrit and hemoglobin concentrations similar to the prestressed level. Etomidate reduced stress as indicated by minimal changes in plasma cortisol, glucose and protein levels during periodic sampling and

TOXICOLOGY; BIOASSAYS (CONTINUED)

82-001920 CONTINUED netting confinement. No histological changes related to etomidate were observed in livers, gills, trunk kidneys or spleens of channel catfish exposed to high sublethal levels of etomidate for 96 hours.

82-001921 Lovegrove, S. M. and B. Eddy. UPTAKE AND ACCUMULATION OF ZINC IN JUVENILE RAINBOW TROUT, *SALMO GAIRDNERI*. *Environ. Biol. Fishes* 7(3):285-289. 1 June 1982. SFA 27(3)
[F.B. Eddy: Dep. Biol. Sci., Univ. Dundee, Dundee DD1 4HN, U.K.] The toxicity of zinc to rainbow trout was determined and the 72 h median lethal concentration was found to be 2.00 $mgl^{-1}$ in freshwater, hardness 7.50 mg $l^{-1}$ as calcium. An insignificant increase in zinc concentration of internal tissues occurred in fish exposed to 1.52 mg $l^{-1}$ in freshwater for 72 h. However, there was a significant uptake of zinc by gills and the body surface. Fish exposed to 10 mg $l^{-1}$ zinc for 72 h in two-thirds sea water showed significant zinc uptake by liver, rectum and muscle, when compared to control fish. Drinking rate decreased from 1.43 to 0.26 ml $kg^{-1}h^{-1}$ when zinc sulphate was added to freshwater. Trout adapted to two-thirds sea water showed no decrease in drinking, about 7 ml $kg^{-1}h^{-1}$ when zinc was added to the water.

82-001922 Malins, D. C. ALTERATIONS IN THE CELLULAR AND SUBCELLULAR STRUCTURE OF MARINE TELEOSTS AND INVERTEBRATES EXPOSED TO PETROLEUM IN THE LABORATORY AND FIELD: A CRITICAL REVIEW. *Can. J. Fish. Aquatic Sci.* 39(6):877-889. June 1982. In English with French summ. SFA 27(3)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

82-001923 McCarter, J. A.; A. T. Matheson; M. Roch; R. W. Olafson and J. T. Buckley. CHRONIC EXPOSURE OF COHO SALMON TO SUBLETHAL CONCENTRATIONS OF COPPER--II. DISTRIBUTION OF COPPER BETWEEN HIGH- AND LOW-MOLECULAR-WEIGHT PROTEINS IN LIVER CYTOSOL AND THE POSSIBLE ROLE OF METALLOTHIONEIN IN DETOXIFICATION. *Comp. Biochem. Physiol. C Comp. Pharmacol.* 72(1):21-26. 1982. SFA 27(3)
[Dep. Biochem. Microbiol., Univ. Victoria, Victoria, BC V8W 2Y2, Canada]

82-001924 McKim, J. M. and H. M. Goeden. A DIRECT MEASURE OF THE UPTAKE EFFICIENCY OF A XENOBIOTIC CHEMICAL ACROSS THE GILLS OF BROOK TROUT (*SALVELINUS FONTINALIS*) UNDER NORMOXIC AND HYPOXIC CONDITIONS. *Comp. Biochem. Physiol. C Comp. Pharmacol.* 72(1):65-74. 1982. SFA 27(3)
[U.S. EPA, 6201 Congdon Blvd., Duluth, MN 55804]

82-001925 Mukhopadhyay, P. K.; A. P. Mukherji and P. V. Dehadrai. CERTAIN BIOCHEMICAL RESPONSES IN THE AIR-BREATHING CATFISH *CLARIAS BATRACHUS* EXPOSED TO SUBLETHAL CARBOFURAN. *Toxicology* 23(4):337-345. 1982. SFA 27(3)
[Cent. Inland. Fish. Res. Inst., (I.C.A.R.) Barrackpore 743101, W.B. India]

82-001926 Murty, A. S. and A. P. Devi. THE EFFECT OF ENDOSULFAN AND ITS ISOMERS ON TISSUE PROTEIN, GLYCOGEN, AND LIPIDS IN THE FISH *CHANNA PUNCTATA*. *Pestic. Biochem. Physiol.* 17(3):280-286. June 1982. SFA 27(3)
[Inst. Wasser Boden Lufthygiene, Versuchsfeld Marienfelde, Schichauweg 58, D-1000 Berlin 49, West Germany]

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82-001927 Norton, M. G. and F. L. Franklin. RESEARCH INTO TOXICITY EVALUATION AND CONTROL CRITERIA OF OIL DISPERSANTS. *Fish. Res. Tech. Rep. Minist. Agric. Fish. Food (Lowestoft)* No. 57. 20p. 1980. SFA 27(3)
[Fish. Lab., Burnham-on-Crouch, England]

82-001928 Oikari, A.; B. Holmbom and H. Bister. UPTAKE OF RESIN ACIDS INTO TISSUES OF TROUT (*SALMO GAIRDNERI* RICHARDSON). *Ann. Zool. Fenn.* 19(1):61-64. 1982. SFA 27(3)
[Div. Physiol., Dep. Zool., Univ. Helsinki, Arkadiankatu 7, SF-00100 Helsinki 10, Finland]

82-001929 Pandey, K. and J. P. Shukla. DELETERIOUS EFFECTS OF ARSENIC ON THE GROWTH OF FINGERLINGS OF A FRESHWATER FISH, *COLISA FASCIATUS* (BL. & SCH.). *Acta Pharmacol. Toxicol.* 50(5):398-400. May 1982. SFA 27(3)
[Dep. Zool., Gorakhpur Univ., Gorakhpur-273001, India]

82-001930 Phipps, G. L.; G. W. Holcombe and J. T. Fiandt. SATURATOR SYSTEM FOR GENERATING TOXIC WATER SOLUTIONS FOR AQUATIC BIOASSAYS. *Prog. Fish-Cult.* 44(2):115-116. Apr. 1982. SFA 27(3)
[U.S. EPA, 6201 Congdon Blvd., Duluth, MN 55804]

82-001931 Sasaki, K.; T. Suzuki; M. Takeda and M. Uchiyama. BIOCONCENTRATION AND EXCRETION OF PHOSPHORIC ACID TRIESTERS BY KILLIFISH (*ORYZIAS LATIPES*). *Bull. Environ. Contam. Toxicol.* 28(6):752-759. June 1982. SFA 27(3)
[Natl. Inst. Hygienic Sci., 18-1 Kamiyoga, 1-chome, Setagaya-ku, Tokyo, Japan]

82-001932 Seikai, T. [ACUTE TOXICITY OF ORGANOPHOSPHOROUS INSECTICIDES ON THE DEVELOPMENTAL STAGES OF EGGS, LARVAE AND JUVENILES OF JAPANESE STRIPED KNIFEJAW *OPLEGNATHUS FASCIATUS.*] *Bull. Jpn. Soc. Sci. Fish.* 48(5):599-603. May 1982. In Japanese with English summ. SFA 27(3)
[Fish. Res. Stn., Kyoto Univ., Mizuru, Kyoto 625, Japan]

82-001933 Sharma, D. C.; P. S. Davis and P. K. Sharma. EFFECT OF ASCORBIC ACID ON BIOTRANSFORMATION AND MODIFICATION OF THE TOXICITY OF MERCURIALS IN GOLDFISH (*CARASSIUS AURATUS*). *Experientia (Basel)* 38(5):565-567. 15 May 1982. SFA 27(3)
[Dep. Biochem., J.L.N. Med. Coll., Ajmer, India]

82-001934 Sharp, J. R. and J. M. Neff. THE TOXICITY OF MERCURIC CHLORIDE AND METHYLMERCURIC CHLORIDE TO *FUNDULUS HETEROCLITUS* EMBRYOS IN RELATION TO EXPOSURE CONDITIONS. *Environ. Biol. Fishes* 7(3):277-284. 1 June 1982. SFA 27(3)
[Dep. Biol., Southeast Mo. State Univ., Cape Girardeau 63701]

82-001935 Shea, T. B. and E. S. Berry. UPTAKE AND TOXICITY OF TOXAPHENE TO CELL CULTURES DERIVED FROM GOLDFISH (*CARASSIUS AURATUS*). *Bull. Environ. Contam. Toxicol.* 29(1):68-75. July 1982. SFA 27(3)
[Dep. Biol., Northeastern Univ., Boston, MA 02115]

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82-001936 Singh, S. M. and P. M. Sivalingam. *IN VITRO* STUDY ON THE INTERACTIVE EFFECTS OF HEAVY METALS ON CATALASE ACTIVITY OF *SAROTHERODON MOSSAMBICUS* (PETERS). *J. Fish Biol.* 20(6):683-688. June 1982. SFA 27(3)
[Sch. Biol. Sci., Univ. Sci. Malaysia, Penang, Malasia]

82-001937 Stagg, R. M. and T. J. Shuttleworth. THE ACCUMULATION OF COPPER IN *PLATICHTHYS FLESUS* L. AND ITS EFFECTS ON PLASMA ELECTROLYTE CONCENTRATIONS. *J. Fish Biol.* 20(4):491-500. Apr. 1982. SFA 27(3)
[Dep. Biol. Sci., Hatherly Lab., The University, Prince of Wales Rd., Exeter, Devon, EX4 4PS, England] Copper was shown to accumulate in the gills, liver, kidney and plasma of seawater-adapted and freshwater-adapted *Platichthys flesus* exposed to elevated ambient concentrations of the metal. Exposure to sublethal concentrations of copper also caused deviations from control values, of the plasma ions sodium and chloride, indicative of impaired ion regulatory capacity.

82-001938 Topping, G. REPORT ON THE 6TH ICES TRACE METAL INTERCOMPARISON EXERCISE FOR CADMIUM AND LEAD IN BIOLOGICAL TISSUE. *Int. Counc. Explor. Sea Coop. Res. Rep.* No. 111. 27p. Feb. 1982. SFA 27(3)
[Int. Counc. Explor. Sea, Palaegade 2-4, 1261 Copenhagen K, Denmark]

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[Fisiol. Anim., Fac. Cienc., Univ. Auto. Barcelona, Barcelona, Spain]

82-001940 Wong, P. T. S.; Y. K. Chau; O. Kramar and G. A. Bengert. STRUCTURE-TOXICITY RELATIONSHIP OF TIN COMPOUNDS ON ALGAE. *Can. J. Fish. Aquatic Sci.* 39(3):483-488. Mar. 1982. In English with French summ. SFA 27(3)
[Can. Cent. Inland Waters, Burlington, ON L7R 4A6, Canada]

82-001941 Woodhead, A. D.; R. B. Setlow and V. Pond. EFFECTS OF POLYCYCLIC AROMATIC HYDROCARBONS ON THE PROLIFERATION OF ECTOPIC THYROID TISSUE IN *POECILIA FORMOSA*, THE AMAZON MOLLY. *J. Fish Biol.* 20(4):455-463. Apr. 1982. SFA 27(3)
[Biol. Dep., Brookhaven Natl. Lab., Upton, NY 11970] A single intraperitoneal injection of any one of several polycylic aromatic hydrocarbons given to young Amazon mollies induces massive enlargement of the spleen. This enlargement is the result of splenic tissue being partially or wholly replaced by proliferating thyroid tissue. The pharyngeal thyroid gland is stimulated but to a lesser degree. No exuberant thyroid tissue is found at any other extrapharyngeal site. We discuss the possible causes of this finding.

82-001942 Yamagata, Y. and M. Niwa. [ACUTE AND CHRONIC TOXICITY OF AMMONIA TO EEL *ANGUILLA JAPONICA*.] *Bull. Jpn. Soc. Sci. Fish.* 48(2):171-176. Feb. 1982. In Japanese with English summ. SFA 27(3)
[Mie Pref. Freshwater Fish. Exp. Stn., Komono, Mie, Mie 510-12, Japan] The lethal effect and growth suppressing effect of ammonia on eel *Anguilla japonica* were examined. The 24h-$LC_{50}$ of total ammonia estimated to be 2844 mg/*l* at pH 5, 820 mg/*l* at pH 7 and 16.8 mg/*l* at pH 9. Estimated concentrations of unionized ammonia nitrogen in the culture media containing total ammonia nitrogen at the level of 24 h-$LC_{50}$ are

TOXICOLOGY; BIOASSAYS (CONTINUED)

82-001942 CONTINUED almost constant (4.6-6.0 mg/*l*) in the pH range from 8 to 9. This fact suggests that an unionized ammonia alone is responsible for the toxicity of ammonia in the pH range, however, in the range of pH from 5 to 7, estimated concentration of unionized ammonia decreased with decreasing pH. Thus, at the pH lower than 7, ionized ammonia must have shown toxicity for the eel together with unionized ammonia. In the chronic toxicity study at pH 6.8 for weeks at 25°C, concentration of more than 01067 mg/*l* of unionized ammonia nitrogen suppressed the growth of eel significantly ($P<0.05$). The limit of safe concentration of unionized ammonia nitrogen for the growth of eel was estimated to be 0.034 mg/*l*. Exposure of fish to unionized ammonia nitrogen for 9 weeks resulted in the increase of erythrocyte number at the concentration of more than 0.067 mg/*l*, and histological as well as pathological changes were observed in the gill tissue at the concentration of 0.121 and 0.228 mg/*l*.

FISH TOXICANTS

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[U.S. FWS, P.O. Box 818, La Crosse, WI 54601]

RESEARCH AND MANAGEMENT-GENERAL

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[Wash. Dep. Fish., Olympia]

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[Rome, Italy]

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[Rome, Italy]

82-001947 Gerking, S. D. THE CHANGING CHARACTER OF FISHERY BIOLOGY. *Fisheries (Bull. Am. Fish. Soc.)* 7(3):5-8. May-June. 1982. SFA 27(3)
[Dep. Zool., Ariz. State Univ., Tempe]

82-001948 Holubetz, T. COLUMBIA RIVER BASIN SALMON AND STEELHEAD MANAGMENT FRAMEWORK PLAN. *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:265-269. 1981. Summary only. SFA 27(3)

RESEARCH AND MANAGEMENT-GENERAL (CONTINUED)

82-001949 Webster, D. A. EARLY HISTORY OF THE ATLANTIC SALMON IN NEW YORK. *N.Y. Fish Game J.* 29(1):26-44. Jan. 1982. SFA 27(3)
[Dep. Nat. Resour., Cornell Univ., Ithaca, NY 14853] The early abundance of Atlantic salmon in New York waters draining into eastern lake Ontario is attested in the accounts of 17th, 18th and early 19th century observers. Of particular interest is the journal kept by DeWitt Clinton in 1810 during his trip by boat up the Mohawk River and down the Oswego River to inspect the route of the contemplated Erie Canal. Illustrative excerpts from this and other accounts are compiled together with comments by the present author in the light of current knowledge. Information concerning salmon in Lake Champlain and the Hudson River is also included.

REPORTS OF FISHERY STATIONS, STATES, ETC.

82-001950 Freshwater Biological Association. FIFTIETH ANNUAL REPORT. *Freshwater Biol. Assoc. Annu. Rep.* 50. 136p. 1982. SFA 27(3)
[The Ferry House, Ambleside, Cumbria LA22 0LP, England]

82-001951 Osborn, M. F. AN OVERVIEW OF THE COASTAL FISHERIES BRANCH OF THE TEXAS PARKS AND WILDLIFE DEPARTMENT. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:6-7. 1981[1982]. Abstract only. SFA 27(3)
[Tex. Parks Wildl. Dep., 4200 Smith School Rd., Austin 78744]

82-001952 Pacific Marine Fisheries Commission. THIRTY-FOURTH ANNUAL REPORT OF THE PACIFIC MARINE FISHERIES COMMISSION FOR THE YEAR 1981. *Pac. Mar. Fish. Comm. Annu. Rep.* 34. 1-47. 1 June 1982. SFA 27(3)
[528 S.W. Mill St., Portland, OR 97201]

HABITAT ALTERATIONS

82-001953 Babcock, W. H. TENMILE CREEK--A STUDY OF STREAM RELOCATION. *Colo. Div. Wildl. Spec. Rep.* No. 52. vi + 22p. Apr. 1982. SFA 27(3)
[Colo. Div. Wildl., 317 W. Prospect, Fort Collins 80526] After input from various interested agencies, three miles of creek were relocated to facilitate the construction of Interstate 70 through Tenmile Canyon west of Denver. The 0.5 million dollar project was designed to provide fish habitat of equal value to that present before construction or, if possible, to improve this habitat. Construction techniques were designed to minimize damage to flora and fauna. After the channels were excavated, rock and log fish habitat structures were constructed. Two years after construction, a 4 percent chance flood occurred at the project area which made almost 75 percent of the habitat structures ineffective. Pool-riffle ratios and quantity and quality of spawning areas remained essentially unchanged throughout the period. Population estimates indicated an increase in the number of fish in the postconstruction period compared to preconstruction numbers. Fish biomass estimates for the two periods. Aquatic invertebrate populations were unchanged as indicated by comparison of three pre- and postconstruction indices.

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82-001954 Bergersen, E. P. and M. Maiolie. COLORADO COOPERATIVE FISHERY RESEARCH UNIT STUDIES AT TWIN LAKES, COLORADO: 1980 REPORT OF FINDINGS. *U.S. Dep. Interior Bur. Reclam. Eng. Res. Cent. Rep.* No. REC-ERC-82-8. vii + 59p. Dec. 1981. SFA 27(3)
[Colo. Coop. Fish. Res. Unit, Colo. State Univ., Fort Collins 80523]

82-001955 Bobbitt, J. and S. Akenhead. INFLUENCE OF CONTROLLED DISCHARGE FROM THE CHURCHILL RIVER ON THE OCEANOGRAPHY OF GROSWATER BAY, LABRADOR. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1097. iv + 43p. May 1982. SFA 27(3)
[Oceans Ltd., P.O. Box 13398, St. John's, NF A1B 4B7, Canada]

82-001956 Harrington, R. W., Jr. and E. S. Harrington. EFFECTS ON FISHES AND THEIR FORAGE ORGANISMS OF IMPOUNDING A FLORIDA SALT MARSH TO PREVENT BREEDING BY SALT MARSH MOSQUITOES. *Bull. Mar. Sci.* 32(2):523-531. Apr. 1982. SFA 27(3)
[Fla. Med. Entomol. Lab., P.O. Box 520, Vero Beach 32960]

82-001957 Hilton, J. and G. L. Phillips. THE EFFECT OF BOAT ACTIVITY ON TURBIDITY IN A SHALLOW BROADLAND RIVER. *J. Appl. Ecol.* 19(1):143-150. Apr. 1982. SFA 27(3)
[Freshwater Biol. Assoc., Windemere, Cumbria, England] Measurements of water turdidity and boat movements were made on a shallow Broadland River, the River Ant, above and below Barton Broad. A simple experimental model of the form $y = a + be^{kt}$ was proposed and tested. It describes the mechanism by which boats can influence turbidity. Of three constants derived from the model, two were shown to be closely related to measured physical variables. The model was used to predict water turbidities from typical boat movement patterns. This demonstrated that long-term build-up of boat induced turbidity through the holiday season was unlikely and that the major part of the turbidity in below Barton Broad on the River Ant was due to algae, not to boating activity.

82-001958 Hunt, R. L. AN EVALUATION OF HALF-LOGS TO IMPROVE BROWN TROUT HABITAT IN EMMONS CREEK. *Wis. Dep. Nat. Resour. Res. Rep.* No. 116. 8p. May 1982. SFA 27(3)
[Wis. Dep. Nat. Resour., Bur. Res., Waupaca] Sixty half-log structures were installed on Emmons Creek, Waupaca County, in a 0.19-mile-long Treatment Zone in April 1978. The wild brown trout (*Salmo trutta*) populations in this zone and in an adjacent upstream Reference Zone (0.34-mile-long) were monitored with electrofishing gear 5 times prior to installation and 6 times thereafter to assess benefits of half-logs to trout carrying capacity. The number of trout in spring and fall, total biomass, number of legal sized trout (6 inches) and number over 10 inches were the four population characteristics focused on to detect response. Only the number of trout over 10 inches in October showed a positive postinstallation change that may have been influenced by half-logs in the Treatment Zone. Other characteristics of the trout population in the Treatment Zone varied seasonally and year to year seemingly independent of the addition of half-logs. Angler harvest, both legal and illegal, was speculated to have increased during the postinstallation period which could have negated, in part, increases in the number and biomass of trout that might have occurred if angling mortality had not increased. Only 1 of the 60 half-logs failed to function at least partially as expected. Average functional utility based on measurements made 48 months after installation was 83%.

HABITAT ALTERATIONS (CONTINUED)

82-001959 LaBounty, J. F. and J. J. Sartoris. STUDIES OF THE EFFECTS OF OPERATING THE MT. ELBERT PUMPED-STORAGE POWERPLANT ON TWIN LAKES, COLORADO: 1980 REPORT OF FINDINGS. *U.S. Dep. Interior Bur. Reclam. Eng. Res. Cent. Rep.* No. REC-ERC-82-7. iii + 56p. Dec. 1981. SFA 27(3)
[U.S Bur. Reclam., Eng. Res. Cent., Denver, CO]

82-001960 Moring, J. R. DECREASE IN STREAM GRAVEL PERMEABILITY AFTER CLEAR-CUT LOGGING: AN INDICATION OF INTRAGRAVEL CONDITIONS FOR DEVELOPING SALMONID EGGS AND ALEVINS. *Hydrobiologia* 88(3):295-298. 9 Apr. 1982. SFA 27(3)
[Me. Coop. Fish. Res. Unit, Dep. Zool., Univ. Me., Orono 04469] Average gravel permeabilities decreased significantly in an Oregon, U.S.A., stream after 82% of the drainage basin was clear-cut. Patterns remained statistically normal in a stream of an unlogged drainage basin and in a stream in a drainage area that was 25% clear-cut, but with riparian buffer strips about 30 m wide left along the stream. It is cautioned that decreases in yearly permeability values can reflect adverse intragravel conditions for developing salmonid eggs and alevins, even if the environmental changes, particularly the amount of sediment fines in gravel, are not as apparent.

82-001961 Nesler, T. P. TWIN LAKES STUDIES: A CHARACTERIZATION OF THE TWIN LAKES FISHERY VIA CREEL CENSUS WITH AN EVALUATION OF POTENTIAL EFFECTS OF PUMPED-STORAGE POWER GENERATION. *U.S. Dep. Interior Bur. Reclam. Eng. Res. Cent. Rep.* No. REC-ERC-82-4. vii + 48p. Nov. 1981. SFA 27(3)
[Colo. Div. Wildl., 317 W. Prospect, Fort Collins 80526]

82-001962 Peters, J. C. EFFECTS OF RIVER AND STREAMFLOW ALTERATION ON FISHERY RESOURCES. *Fisheries (Bull. Am. Fish. Soc.)* 7(2):20-22. Mar.-Apr. 1982. SFA 27(3)
[Bur. Reclam., Environ. Affr. Off., Eng. Res. Cent., Denver, CO]

82-001963 Schwille, E. M. BENEFICIAL FISH AND WILDLIFE FEATURES IN FLOODWATER RETARDING STRUCTURES. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:18. 1981[1982]. Abstract only. SFA 27(3)
[U.S. Soil Conserv. Serv., Terrell, TX]

82-001964 Seehorn, M. E., (compiler). PROCEEDINGS OF THE TROUT STREAM HABITAT IMPROVEMENT WORKSHOP. *Proc. Trout Stream Habitat Improvement Workshop* iv + 158p. 1980(1982). Available from U.S. For. Serv., 1720 Peachtree Rd., NW, Atlanta, GA 30367]

82-001965 Simons, D. B.; R. M. Li; P. Lagasse and R. T. Milhous. PROCEEDINGS: WORKSHOP ON DOWNSTREAM RIVER CHANNEL CHANGES RESULTING FROM DIVERSIONS OR RESERVOIR CONSTRUCTION. *U.S. Fish. Wildl. Serv.* FWS/OBS-91/48. v + 347p. Sept. 1982. SFA 27(3)
[Colo. State Univ., Fort Collins 80523]

82-001966 Storck, T. W.; D. W. Dufford and W. U. Brigham. THE EFFECTS OF RESERVOIR WATER LEVEL FLUCTUATION ON UTILIZATION OF A SMALL TRIBUTARY STREAM BY STREAM AND RESERVOIR FISH POPULATIONS. *Trans. Ill. State Acad. Sci.* 74(1-2):147-155. 1981. SFA 27(3)
[Ill. Nat. Hist. Surv., R.R. 1, Box 157, Sullivan 61951] Six stations on Whitley Creek were sampled with a boat shocker and seines in years of

HABITAT ALTERATIONS (CONTINUED)

82-001966 CONTINUED moderate and high reservoir water level fluctuation. Stations were chosen to provide for the sampling of impounded and lotic habitats. Physical alteration of stream habitat caused by silting, and population pressure exerted by the influx of reservoir species into impounded areas were temporary. Stream species quickly recolonized impounded areas when these areas reverted to stream conditions and reservoir species did not persist in stream habitat. Large areas of Whitley Creek impounded by high water in the spring and summer of 1974 served as nursery areas for many reservoir species. The young-of-the-year produced in this habitat apparently returned to the reservoir in autumn and may have contributed to the recruitment of reservoir populations.

HARVEST, CREEL CENSUS, ETC.

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[Rome, Italy]

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[Dep. Agric. Resour. Econ., Univ. Me., Orono]

82-001969 Samples, K. C. ESTIMATING RECREATIONAL FISHING BENEFITS USING A LOGIT MODEL. *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:170-180. 1981. SFA 27(3)
[Dep. Agric. Resour. Econ., Univ. Hawaii, Manoa]

82-001970 Wespestad, V. G. and J. M. Terry. A PRELIMINARY BIOECONOMIC MODEL OF THE POLLOCK FISHERY IN THE EASTERN BERING SEA. *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:200-204. 1981. SFA 27(3)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

REGULATIONS

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[Oceanogr. Dep., Dalhousie Univ., Halifax, NS B3H 4J1, Canada]

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[N. Mex. Dep. Game Fish, Santa Fe]

MARKING AND TAGGING

82-001973 Arnason, A. N.; C. R. Krasey and K. H. Mills. A COMPUTER PROGRAM FOR PREDICTING PRECISION AND TAG-LOSS BIAS IN JOLLY-SEBER MARK-RECAPTURE ESTIMATES. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1083. iv + 42p. June 1982. In English with French summ. SFA 27(3)
[Dep. Fish. Oceans, Winnipeg, MB R3T 2N6, Canada]

82-001974 Cheeseman, C. L. and R. B. Mitson, (eds.). TELEMETRIC STUDIES OF VERTEBRATES. *Symp. Zool. Soc. Lond.* No. 49. xix + 368p. 1982. SFA 27(3)
A collection of papers.--RS

82-001975 Hankin, D. G. ESTIMATING ESCAPEMENT OF PACIFIC SALMON: MARKING PRACTICES TO DISCRIMINATE WILD AND HATCHERY FISH. *Trans. Am. Fish. Soc.* 111(3):286-298. May 1982. SFA 27(3)
[Dep. Fish., Humboldt State Univ., Arcata, CA 95521]

82-001976 Jenkinson, D. W. and H. T. Bilton. ADDITIONAL GUIDELINES TO MARKING AND CODED WIRE TAGGING OF JUVENILE SALMON. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1051. iv + 24p. Dec. 1981. In English with French summ. SFA 27(3)
[Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

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[NMFS, P.O. Box 155, Auke Bay, AK 99821]

82-001978 McAfee, M. E. FLUORESCENT PIGMENT SPRAY-MARKING: DO WE KNOW WHERE WE STAND? *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:270-272. 1981. SFA 27(3)
[Colo. Div. Wildl., Grand Junction]

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[Lab. Geophys. Appl., Univ. Paris VI, 4, place Jussieu, 75230 Paris Cedex 05, France] The authors have reviewed the different ways of fixing tracking transmitters on fish. Then they studied abdominal surgical implantation. Sixty trouts (average weight 525 g($s$= 143)) were equipped with dummy transmitters of various characteristics: Length: 2, 4, 6, 8 cm. Weight: 0, 3, 5, 6, 9, 10, 15 g (in water). Diameter: 12 mm. After their operation trouts were hold 15 days in a tank. Each fish was observed 12 minutes in a day. Different criteria were used to study fish perturbation: Spontaneous activity, growth, number of avoidance and pursuits, time during which the fish stayed motionless on bottom: we computed the correlation of these different criteria on transmitter weight and length. It appeared that transmitter weight caused a significant decrement in the three first criteria and transmitter length in spontaneous activity only. Survival rate was 75%. X-ray photographs revealed some displacements of the transmitter: it often staid at the rear end of the body cavity. Hydrostatic equilibrium was regained only actively: there was no compensation of extratransmitter weight by fish density variation. Histological study revealed that tissues in

MARKING AND TAGGING (CONTINUED)

82-001979 CONTINUED contact with transmitter (peritoneum) showed a proliferation reaction and heavy vascularisation.

STOCKING AND INTRODUCTIONS

82-001980 Bilton, H. T. RETURNS OF ADULT COHO SALMON FROM RELEASES OF ACCELERATED AND NORMALLY REARED JUVENILES. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1054. iv + 22p. Feb. 1982. In English with French summ. SFA 27(3)
[Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada] In the fall of 1976, and the fall of 1977, two groups of coho differing only in method of incubation were accelerated at Rosewall Creek. On June 24-27, 1977, 10,786 marked and nose-tagged 9.9-g accelerated smolts were released from Rosewall Creek. Of these 4,187 were held in Heath-type trays, the remaining 6,599 were held in Heath-type try as until the "eyed" stage and then transferred to gravel incubation boxes. The total return (escapement and fishery) was 2.48%. There was no difference in the returns from the two sub-groups that had different incubation histories. On June 23, 1978, 13,271 marked and nose-tagged 14.6-g accelerated smolts were released along with 9,892 normally reared (14-mo) 13.1 g, nose-tagged coho. Of these, 3,574 of the normally reared juveniles, were held in Heath-type trays, and the remaining 6,318 were held in Heath-type trays until the "eyed" stage and then transferred to gravel incubation boxes. The return (escapement and fishery) of accelerated fish was 0.60%, that from the normally reared fish was 4.38%. There was no difference in the returns from the two sub-groups that had different incubation histories. The overall return of adults from normal smolts released in the same year as the accelerated smolts (1978) was 7.3 times normally reared smolts was far below the return expected for fish of that size released on that date. The returns from the two accelerated releases were much lower than the average return of 25% expected for normally reared smolts released from B.C. production hatcheries. The data are suggestive that zero-age smolts, as currently produced, may prove ineffective as a means of building up stocks of coho salmon through hatchery manipulation.

82-001981 Bilton, H. T.; D. F. Alderdice and J. T. Schnute. INFLUENCE OF TIME AND SIZE AT RELEASE OF JUVENILE COHO SALMON (*ONCORHYNCHUS KISUTCH*) ON RETURNS AT MATURITY. *Can. J. Fish. Aquatic Sci.* 39(3):426-447. Mar. 1982. In English with French summ. SFA 27(3)
[Dep. Fish. Oceans, Resour. Serv. Br., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

FISHING GEAR AND TECHNIQUES

82-001982 Bishop, C. A. COD TRAP MESH SELECTION STUDIES. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1075. iv + 47p. Mar. 1982. In English with French summ. SFA 27(3)
[Dep. Fish. Oceans, P.O. Box 5667, St. John's, NF A1C 5X1, Canada]

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[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station]

FISHING GEAR AND TECHNIQUES (CONTINUED)

82-001984 Cada, G. F. and J. M. Loar. RELATIVE EFFECTIVENESS OF TWO ICHTHYOPLANKTON SAMPLING TECHNIQUES. *Can. J. Fish. Aquatic Sci.* 39(6):811-814. June 1982. In English with French summ. SFA 27(3)
[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830]

82-001985 Craig, J. F. and J. M. Fletcher. THE VARIABILITY IN THE CATCHES OF CHARR, *SALVELINUS ALPINUS* L., AND PERCH, *PERCA FLUVIATILIS* L., FROM MULTI-MESH GILL NETS. *J. Fish Biol.* 20(5):517-526. May 1982. SFA 27(3)
[Freshwater Biol. Assoc., Windermere Lab., Ambleside, Cumbria LA22 0LP, England] Multi-mesh gill nets set a Rawlinson's Nab in the south basin of Windermere for 24 months from 1979 to 1981 caught predominantly charr and perch. Nets set parallel to the shore caught significantly fewer fish than those set perpendicular to the shore. Variability in the mean catches of perch increased from winter to summer when the size of the catches also increased. Charr were mostly caught from November until February. Estimates of variance associated with the geometric mean catch of a single net (set perpendicular to the shore) were calculated for the periods winter for the charr and winter, summer, spring and autumn for the perch. These variances were used to calculate 95 and 99% C.L. of the geometric mean. For limits to be below half or twice the geometric mean, 12 nets would have to be used for charr during winter. For perch the number of nets needed would be six in winter, 20 in spring and autumn and 40 in summer. It is concluded that the nets are of little value in assessing changes in stock abundance.

82-001986 Eggers, D. M.; N. A. Rickard; D. G. Chapman and R. R. Whitney. A METHODOLOGY FOR ESTIMATING AREA FISHED FOR BAITED HOOKS AND TRAPS ALONG A GROUND LINE. *Can. J. Fish. Aquatic Sci.* 39(3):448-453. Mar. 1982. In English with French summ. SFA 27(3)
[Fish. Res. Inst., Sch. Fish., Univ. Wash., Seattle 98195]

82-001987 Hubert, W. A. and D. N. Schmitt. FACTORS INFLUENCING HOOP NET CATCHES IN CHANNEL HABITATS OF POOL 9, UPPER MISSISSIPPI RIVER. *Proc. Iowa Acad. Sci.* 89(2):84-88. June 1982. SFA 27(3)
[Iowa Coop. Fish. Res. Unit, Iowa State Univ., Ames 50011] The catch per unit of effort and species selectivity of two hoop net types fished in channel habitats of Pool 9 were described. Variation in catch was noted between the two net types, as well as between sampling areas and channel types. The total catch with bait nets was 580 fish in the main channel border and 539 in side channels, while buffalo nets captured 1,213 fish from the main channel border and 1,004 from side channels with the same amount of fishing effort. Six species comprised 93% of the bait net samples: shorthead redhorse, black crappie, freshwater drum, flathead catfish, bluegill, and channel catfish. The six most abundant species in buffalo nets were: shorthead redhorse, freshwater drum, smallmouth buffalo, mooneye, bluegill, and common carp. Species collected in greater numbers in main channel border habitats were: gizzard shad, mooneye, quillback, white sucker, smallmouth buffalo, bigmouth buffalo, channel catfish, flathead catfish, and black crappie. Side channels produced greater numbers of common carp, shorthead redhorse, and bluegill. Multiple regression analysis showed that variation in water temperature, current velocity, turbidity, dissolved oxygen, channel type, and sampling area accounted for variation in the catch of several fish species. Turbidity was the most common variable to be related to catch and tended to have a negative relationship.

FISHING GEAR AND TECHNIQUES (CONTINUED)

82-001988 Main, J. and G. I. Sangster. A STUDY OF THE FISH CAPTURE PROCESS IN A BOTTOM TRAWL BY DIRECT OBSERVATIONS FROM A TOWED UNDERWATER VEHICLE. *Scott. Fish. Res. Rep.* No. 23. 23p. 1981. SFA 27(3)
[Mar. Lab., Aberdeen, Scotland]

82-001989 Matlock, G. C.; J. E. Weaver and A. W. Green. SAMPLING NEARSHORE ESTUARINE FISHES WITH ROTENONE. *Trans. Am. Fish. Soc.* 111(3):326-331. May 1982. SFA 27(3)
[Coast. Fish. Br., Tex. Parks Wildl. Dep., 4200 Smith School Rd., Austin 78744]

82-001990 Pati, S. OBSERVATIONS ON THE EFFECT OF TROPICAL CYCLONES ON GILLNETTING IN THE BAY OF BENGAL. *J. Cons. Cons. Int. Explor. Mer* 40(1):62-66. Feb. 1982. SFA 27(3)
[Dep. Zool., Ravenshaw Coll., Cuttack 753003, Orissa, India] Cyclones originating in the Bay of Bengal invariably hit Orissa and adjacent coasts during peak fishing seasons. The impact of these storms on a coastal fishery was studied for the first time in Indian waters. The investigation covered a period of seven years from 1969 to 1976. The effect of a storm on a coastal gillnet fishery depends upon the wind velocity, the direction of the storm track and its distance from the fishing area, and the coastal configuration. A "direct hit" on the fishing area always reduced the catch for the next 14 days, irrespective of the intensity of the wind. Severe cyclonic storms passing the fishing area within a radius of 400 km reduced the catch. A milder storm passing beyond a range of 100 km increased the catch in the following 14 days. Out of 10 cyclones for which landing data were available, six had adverse effect on gillneting.

82-001991 Scholes, P. THE EFFECT OF WIND DIRECTION ON TRAWL CATCHES; AN ANALYSIS OF HAUL-BY-HAUL DATA. *J. Cons. Cons. Int. Explor. Mer* 40(1):81-93. Feb. 1982. SFA 27(3)
[Fish. Lab., Lowestoft, Suffolk NR33 0HT, England]

82-001992 Strange, E. S. AN INTRODUCTION TO COMMERCIAL FISHING GEAR AND METHODS USED IN SCOTLAND. *Scott. Fish. Inf. Pamph.* No. 1 (revised). 35p. 1981. SFA 27(3)
[Mar. Lab., Aberdeen, Scotland]

82-001993 Williams, G. H.; D. A. McCaughran; S. H. Hoag and T. M. Koeneman. A COMPARISION OF PACIFIC HALIBUT AND TANNER CRAB CATCHES IN (1) SIDE-ENTRY AND TOP-ENTRY CRAB POTS AND (2) SIDE-ENTRY CRAB POTS WITH AND WITHOUT TANNER BOARDS. *Int. Pac. Halibut Comm. Tech. Rep.* No. 19. p. 15-35. 1982. SFA 27(3)
[Int. Pac. Halibut Comm., P.O. Box 5009, University Station, Seattle, WA 98105] Catch rates of Pacific halibut (*Hippoglossus stenolepis*) and Tanner crab (*Chionoecetes bairdi*) by several types of crab pot were compared. Top-entry crab pots had substantially lower catch rates of halibut than side-entry pots. Catch rates of legal Tanner crab in top-entry pots were only slightly lower than in side-entry pots, but the sample sizes were considered too small to clearly demonstrate this difference. "Tanner boards", which are placed horizontally across the upper half of the tunnel opening, reduced the catch rate of halibut by side-entry pots by 63%. In addition, the catch of halibut over 90cm long was almost eliminated. Tanner boards also reduced the catch rate of Tanner crab by side-entry pots, but overall crab catches were not large enough to provide meaningful results. Further research is recommended on crab pot modifications, and an observer program is

FISHING GEAR AND TECHNIQUES (CONTINUED)

82-001993 CONTINUED recommended to establish halibut incidence rates in the commercial crab fisheries.

FERTILIZATION OF SOIL AND WATER

82-001994 Hultberg, H. and I. B. Andersson. LIMING OF ACIDIFIED LAKES: INDUCED LONG-TERM CHANGES. *Water Air Soil Pollut.* 18(1-3):311-331. July, Aug., Sept. 1982. SFA 27(3)
[Swedish Water Air Pollut. Res. Inst., P.O. Box 5207, S-402 24, Gothenburg, Sweden]

FISHWAYS, FISH PASSAGE THROUGH DAMS, ETC.

82-001995 Eicher, G. J. FISH PASSAGE IN NEW SOUTH WALES. *Fisheries (Bull. Am. Fish. Soc.)* 7(3):2-4. May-June 1982. SFA 27(3)

82-001996 Rhone, J. P. and A. B. Schlesinger. AN ANALYSIS OF FISH IMPINGEMENT RELATIVE TO THE MISSOURI RIVER ADULT FISH POPULATION IN THE VICINITY OF THE NEBRASKA CITY POWER STATION, UNIT NO. 1. *Proc. Nebr. Acad. Sci. Affil. Soc.* 92:16-17. 1982. Abstract only. 1982. SFA 27(3)
[Omaha Publ. Power Dist., Omaha, NE 68102]

MATHEMATICS, STATISTICAL METHODS, AND MODELING

82-001997 Cushing, D. H. A SIMULACRUM OF THE ICELAND COD STOCK. *J. Cons. Cons. Int. Explor. Mer* 40(1):27-36. Feb. 1982. SFA 27(3)
[1981 Yarmouth Rd., Lowestoft, Suffolk NR32 4AB, England]

82-001998 DeAngelis, D. L. and C. C. Coutant. GENESIS OF BIMODAL SIZE DISTRIBUTIONS IN SPECIES COHORTS. *Trans. Am. Fish. Soc.* 111(3):384-388. May 1982. SFA 27(3)
[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830]

82-001999 Jensen, A. L. ADJUSTING FISHERY CATCH CURVES FOR TRAWL SELECTION USING THE LOGISTIC DISTRIBUTION. *J. Cons. Cons. Int. Explor. Mer* 40(1):17-20. Feb. 1982. SFA 27(3)
[Sch. Nat. Resour., Univ. Mich., Ann Arbor 48109] The logistic distribution, a probability distribution in shape similar to the normal distribution, is applied to correct catch curves for trawl selection. The logistic probability density and distribution functions can be integrated in closed form, and this enables inclusion of a term for gear selection in the equation that describes population size as a function of age. The model is

MATHEMATICS, STATISTICAL METHODS, AND MODELING (CONTINUED)

82-001999 CONTINUED applied to the North Sea plaice fishery and the results are compared with those of cohort analysis.

82-002000 Quinn, T. J. II; S. H. Hoag and G. M. Southward. COMPARISON OF TWO METHODS OF COMBINING CATCH-PER-UNIT-EFFORT DATA FROM GEOGRAPHIC REGIONS. *Can. J. Fish. Aquatic Sci.* 39(6):837-846. June 1982. In English with French summ. SFA 27(3)
[Int. Pac. Halibut Comm., P.O. Box 5009, University Station, Seattle, WA 98105]

82-002001 Shepherd, J. G. A VERSATILE NEW STOCK-RECRUITMENT RELATIONSHIP FOR FISHERIES, AND THE CONSTRUCTION OF SUSTAINABLE YIELD CURVES. *J. Cons. Cons. Int. Explor. Mer* 40(1):67-75. Feb. 1982. SFA 27(3)
[Fish. Lab., Lowestoft, Suffolk NR33 0HT, England]

82-002002 Silvert, W. OPTIMAL UTILIZATION OF A VARIABLE FISH SUPPLY. *Can. J. Fish. Aquatic Sci.* 39(3):462-468. Mar. 1982. In English with French summ. SFA 27(3)
[Bedford Inst. Oceanogr., P.O. Box 1006, Dartmouth, NS B2Y 4A2, Canada]

82-002003 Sims, S. E. THE EFFECT OF UNEVENLY DISTRIBUTED CATCHES ON STOCK-SIZE ESTIMATES USING VIRTUAL POPULATION ANALYSIS (COHORT ANALYSIS). *J. Cons. Cons. Int. Explor. Mer* 40(1):47-52. Feb. 1982. SFA 27(3)
[Dep. Math. Stat., La. Tech. Univ., Ruston 71272] The relative error in the value of the stock size calculated by Virtual Population Analysis (Cohort Analysis) that results from assuming that catches are evenly distributed throughout the year when, in fact, they are not is examined using both analytic methods and simulation. A measure of the intra-year distribution of catches called the balance is defined, and a relationship between the relative error in the calculated values of stock size, the balance, the natural mortality rate, and the rate of exploitation is derived.

82-002004 Thompson, K. W.; M. L. Deaton; R. V. Foutz; J. Cairns, Jr. and A. C. Hendricks. APPLICATION OF TIME-SERIES INTERVENTION ANALYSIS TO FISH VENTILATORY RESPONSE DATA. *Can. J. Fish. Aquatic Sci.* 39(3):518-521. Mar. 1982. In English with French summ. SFA 27(3)
[Dep. Biol., Univ. Miss., University 38677]

LAKE MANAGEMENT AND RESEARCH

82-002005 Bennett, J. R. SOME EFFECTS OF MANIPULATING A NATURAL BROOK TROUT POPULATION IN A SUBALPINE LAKE. *Ph.D. dissertation, Univ. Wyo.* 137p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(10):3976. Apr. 1982. SFA 27(3)

82-002006 Bettoli, P. W. ANALYSIS OF COVE ROTENONE DATA COLLECTED IN LAKE CONROE, TEXAS. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:17. 1981[1982]. Abstract only. SFA 27(3)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station]

LAKE MANAGEMENT AND RESEARCH (CONTINUED)

82-002007 Ishak, M. M.; S. A. Abdel-Malek and M. M. Shafik. DEVELOPMENT OF MULLET FISHERIES (MUGILIDAE) IN LAKE QUARUN, EGYPT. *Aquaculture* 27(3):251-260. Apr. 1982. SFA 27(3)
[Inst. Oceanogr. Fish., Inland Waters Fish Cult. Div., 101 Ksr Al-Ainy St., Cairo, Egypt] The water of Lake Quarun have undergone severe chemical changes in the last 50 years. Salinity has increased progressively and is now 38°/oo in some regions of the lake. *Tilapia zillii* is the only species that has not been affected by the salinity increase. Mullet fry have been stocked in the lake since 1928. There has been a progressive increase in the average total production of mullet from 0.45 tons (1929-32) to 128.25 tons (1966-69), and to 291.67 tons (1975/76-1978/79). Length and age composition of mullets in Lake Quarun were studied. The growth in length and weight of *Mugil cephalus* showed that the fish were in better condition in Lake Quarun than in other coastal areas of Egypt. It is recommended that studies should continue to improve survival of transplanted mullet fry into the lake, and on the artificial propagation of mullets on site.

82-002008 Muller, R. G.; R. S. Benda and T. G. Powell. EXPLOITATION OF FISH IN THE INNER KAVIRONDO GULF OF LAKE VICTORIA BASED ON TAG RETURNS. *J. Fish Biol.* 20(6):667-671. June 1982. SFA 27(3)
[4015 Boulder Ave., Odessa, TX 79761]

82-002009 Selgeby, J. H. DECLINE OF LAKE HERRING (*COREGONUS ARTEDII*) IN LAKE SUPERIOR: AN ANALYSIS OF THE WISCONSIN HERRING FISHERY, 1936-78. *Can. J. Fish. Aquatic Sci.* 39(4):554-563. Apr. 1982. In English with French summ. SFA 27(3)
[U.S. FWS, Great Lakes Fish. Lab., Ashland Biol. Stn., Ashland, WI 54806]

82-002010 Swanson, B. L. ARTIFICIAL TURF AS A SUBSTRATE FOR INCUBATING LAKE TROUT EGGS ON REEFS IN LAKE SUPERIOR. *Prog. Fish-Cult.* 44(2):109-111. Apr. 1982. SFA 27(3)
[Wis. Dep. Nat. Resour., Bayfield 54814]

82-002011 Thorson, T. B. THE IMPACT OF COMMERCIAL EXPLOITATION ON SAWFISH AND SHARK POPULATIONS IN LAKE NICARAGUA. *Fisheries (Bull. Am. Fish. Soc.)* 7(2):2-10. Mar.-Apr. 1982. SFA 27(3)
[Sch. Life Sci., Univ. Nebr., Lincoln]

82-002012 Trautmann, N. M.; C. E. McCulloch and R. T. Oglesby. STATISTICAL DETERMINATION OF DATA REQUIREMENTS FOR ASSESSMENT OF LAKE RESTORATION PROGRAMS. *Can. J. Fish. Aquatic Sci.* 39(4):607-610. Apr. 1982. In English with French summ. SFA 27(3)
[Dep. Nat. Resour., Cornell Univ., Ithaca 14853]

RIVER AND STREAM MANAGEMENT AND RESEARCH

82-002013 Gutierrez, W.; S. Delgado and J. Vera. INVESTIGATION SOBRE LOS POSIBLES EFECTOS DEL REPRESAMIENTO DEL RIO PUYANGO TUMBES EN LA HIDROBIOLOGIA Y PESQUERIAS DE LA REGION. [INVESTIGATION OF THE POSSIBLE EFFECTS OF IMPOUNDING THE PUYANGO-TUMBES RIVER ON THE HYDROBIOLOGY AND FISHERIES OF THE REGION.] *Inst. Mar. Peru (Callao) Inf.* No. 75. 39p. 1980. In Spanish with English summ. SFA 27(3)
[Invest. Pesq. Aguas Cont., Callao, Peru]

RIVER AND STREAM MANAGEMENT AND RESEARCH (CONTINUED)

82-002013 CONTINUED

82-002014 Orth, D. J. and O. E. Maughan. EVALUATION OF THE INCREMENTAL METHODOLOGY FOR RECOMMENDING INSTREAM FLOWS FOR FISHES. *Trans. Am. Fish. Soc.* 111(4):413-445. July 1982. SFA 27(3)
[Dep. Fish. Wildl. Sci., VPI & SU, Blacksburg, VA 24061]

FARM POND AND SMALL IMPOUNDMENT MANAGEMENT AND RESEARCH

82-002015 Farquhar, B. W. EVALUATION OF STRIPED BASS X WHITE BASS HYBRIDS IN SMALL IMPOUNDMENTS. *Annu. Proc. Tex. Chap. Am. Fish. Soc.* 4:55-66. 1981[1982]. SFA 27(3)
[Tex. Parks Wildl. Dep., 6200 Hatchery Rd., Fort Worth 76114] A study was conducted to evaluate the effects of striped bass (*Morone saxatilis*) x white bas (*M. chrysops*) hybrids on existing fish populations and sport fish harvest in small impoundments. Two lakes (40 and 42 ha) were initially stocked with 50 hybrids/ha (30 mm TL), followed by two years of supplemental stocking (25-50/ha). Growth rates of hybrids and selected centrarchids were monitored, and creel surveys conducted to determine effects of the hybrid introductions. Over the study period hybrids failed to reach sufficient size in adequate numbers in either lake to significantly impact existing fish populations or sport fishery. Hybrid growth was consistently lower in both lakes than those of hybrids found in larger reservoirs, and survival in one lake was apparently poor. The unsuccessful hybrid introduction could probably be attributed to competition with overabundant crappies (*Pomoxis* spp.) for available forage.

82-002016 Peters, E. J. A STUDY OF THE FISHES OF BUCKLEY CREEK RESERVOIR, JEFFERSON COUNTY, NEBRASKA. *Proc. Nebr. Acad. Sci. Affil. Soc.* 92:14. 1982. Abstract only. SFA 27(3)
[Dep. For. Fish. Wildl., Inst. Agric. Nat. Resour., Univ. Nebr., Lincoln 68583-0819]

LARGE IMPOUNDMENT MANAGEMENT AND RESEARCH

82-002017 Murphy, B. R. GENETIC EVALUATION OF WALLEYE (*STIZOSTEDION VITREUM VITREUM*) STOCK STRUCTURE AND RECRUITMENT IN CLAYTOR LAKE, VIRGINIA. *Ph.D. dissertation, VPI&SU* 116p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(10):3893. Apr. 1982. SFA 27(3)
Multiple genetic stocks of walleyes can exist in a relatively small reservoir ecosystem, particularly in mainstream impoundments were very diverse habitats are often spatially isolated due to the large size of these reservoirs. The existence of these multiple stocks is an important consideration for effective management. Particular management strategies may not impact all genetic stocks in the reservoir equally (particularly if they are spatially isolated), and therefore may not produce the desired or expected results if the population is treated as being homogenous.

ESTUARY MANAGEMENT AND RESEARCH

82-002018 Durand, J. R. and M. Skubich. LES LAGUNES IVOIRIENNES. [THE LAGOONS OF THE IVORY COAST.] *Aquaculture* 27(3):211-250. Apr. 1982. In French with English summ. SFA 27(3)
[Cent. Rech. Oceanogr., B. P. V18, Abidjan, Ivory Coast]

MARINE MANAGEMENT AND RESEARCH

82-002019 Ajayi, T. O. THE MAXIMUM SUSTAINABLE YIELDS OF THE INSHORE FISH AND SHRIMP RESOURCES OF THE NIGERIAN CONTINENTAL SHELF. *J. Fish Biol.* 20(5):571-577. May 1982. SFA 27(3)
[Nigerian Inst. Oceanogr. Mar. Res., P.M.B. 12729, Victoria Island, Lagos, Nigeria] Schaefer's and exponential models are used to predict the maximum sustainable yields (MSY) of the Nigerian inshore fish and shrimp resources. The MSY values for fish caught down to 40 and 50 m were 11684.09 and 13742.35 metric tonnes (t), respectively. For shrimp, the MSY estimated was 2008.02 t. It appeared that the inshore fishery still had room for expansion, but the shrimp resources seemed to be fully exploited under the prevailing circumstances.

82-002020 Brill, R. W. THE FUTURE OF BILLFISH RESEARCH: WHERE CAN WE GO FROM HERE? *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:52-57. 1981. SFA 27(3)

82-002021 ENVIRONMENTAL SURVEY TECHNIQUES FOR COASTAL WATER ASSESSMENT CONFERENCE PROCEEDINGS. *Proc. Environ. Surv. Techniques Coastal Water Assessment* v + 229p. Jan. 1980. SFA 27(3)
Available from Water Resour. Res. Cent., Univ. Hawaii, Manoa.

82-002022 FAO of the UN. REPORT OF THE SECOND TECHNICAL CONSULTATION ON STOCK ASSESSMENT IN THE ADRIATIC. *FAO Fish. Rep.* No. 253. ix + 186p. 1981. In French and English. SFA 27(3)
[Rome, Italy]

82-002023 FAO of the UN. REPORT OF THE FIRST SESSION OF THE COMMITTEE FOR THE DEVELOPMENT AND MANAGEMENT OF FISHERIES IN THE SOUTHWEST INDIAN OCEAN. *FAO Fish. Rep.* No. 254. vii + 58p. 1981. SFA 27(3)
[Rome, Italy]

82-002024 FAO of the UN. REPORT OF THE SEVENTH SESSION OF THE FISHERY COMMITTEE FOR THE EASTERN CENTRAL ATLANTIC (CECAF). *FAO Fish. Rep.* No. 255. xiii + 95p. 1981. SFA 27(3)
[Rome, Italy]

82-002025 FAO of the UN. REPORT OF THE TECHNICAL CONSULTATION ON THE UTILIZATION OF SMALL PELAGIC SPECIES IN THE MEDITERRANEAN AREA. *FAO Fish. Rep.* No. 252. viii + 159p. 1982. In English and French. SFA 27(3)
[Rome, Italy]

MARINE MANAGEMENT AND RESEARCH (CONTINUED)

82-002026 Fithian, P. S. HAWAII SPORT FISHING. *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:46-50. 1981. SFA 27(3)

82-002027 Fougner, S. DEVELOPMENT OF A FISHERY MANAGEMENT PLAN FOR BILLFISH IN THE WESTERN PACIFIC FISHERY CONSERVATION ZONE. *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:51. 1981. Abstract only. SFA 27(3)

82-002028 Goeden, G. B. INTENSIVE FISHING AND A 'KEYSTONE' PREDATOR SPECIES: INGREDIENTS FROM COMMUNITY INSTABILTY. *Biol. Conserv.* 22(4):273-281. Apr. 1982. SFA 27(3)
[Queensl. Fish. Serv., North. Fish Res. Cent., Bungalow, Queensland 4870, Australia] A series of surveys of demersal fish stocks were carried out along the Great Barrier Reef in order to assess their condition and to investigate the effects of fishing on the large-predator community. Results from the surveys indicate that a significant relationship exists between the abundance of a 'keystone' predator species and the distance from major human population centres. Removal of this predator through fishing has the effect of bringing about changes in the relative abundance of other large predatory species including several that do not comprise part of the usual catch. Although the changes in community structure are apparently unpredictable, it is possible to calculate a measure of community flux which reflects the rate of this change relative to variations in the abundance of the keystone species.

82-002029 Griben, M. R.; W. A. Karp; C. M. Lynde and L. J. Bledsoe. PRESENT STATUS OF THE UNITED STATES HALIBUT FISHERY. *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:28-45. 1981. SFA 27(3)
[Tetra Tech, Inc., 1900 116th Ave. N.E., Bellevue, WA 98004]

82-002030 Gulland, J. A. LONG-TERM POTENTIAL EFFECTS FROM MANAGEMENT OF THE FISH RESOURCES OF THE NORTH ATLANTIC. *J. Cons. Cons. Int. Explor. Mer* 40(1):8-16. Feb. 1982. SFA 27(3)
[Dep. Fish., FAO, Via delle Terme di Caracalla, I-00100 Rome, Italy] Long-term benefits from improved fishery management can be placed in four classes--greater gross value of the catch; reduced costs of capture; better allocation of benefits, e.g. between different regions, or different sections of the community; and reduced administrative and similar burdens. These benefits are discussed in general terms, and in relation to the value of the North Sea fisheries. Though the volume of the catch from the North Sea has more than doubled in the last 20 years, the value (at fixed prices) has probably not changed much. Different patterns of fishing might increase the value of the North Sea catch by 50% or more. The total net benefits from better management of the northeast Atlantic fisheries might be a billion ($10^9$) dollars annually.

82-002031 Hourston, A. S. FORECASTING BRITISH COLUMBIA HERRING STOCKS, 1973-1981. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1047. iv + 43p. Dec. 1982. In English with French summ. SFA 27(3)
[Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

82-002032 International Council for the Exploration of the Sea. REPORT OF THE DIALOGUE MEETING, 18 SEPTEMBER 1981. *Int. Counc. Explor. Sea Coop. Res. Rep.* No. 113. 33p. Feb. 1982. SFA 27(3)
[Palaegade 2-4, 1261 Copenhagen K, Denmark]

MARINE MANAGEMENT AND RESEARCH (CONTINUED)

82-002033 Pepperell, J. C. USE OF TAGGING DATA TO STUDY SOME ASPECTS OF THE BIOLOGY OF BLACK MARLIN, *MAKAIRA INDICA*, ON THE EAST COAST OF AUSTRALIA. *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:75-87. 1981. SFA 27(3)
[New South Wales State Fish., P.O. Box N211 Grosvenor St., Sidney 2000, Australia]

82-002034 Shomura, R. S. SUMMARY REPORT OF THE TECHNICAL PANEL DISCUSSION, TUNA BIOLOGY AND MANAGMENT. *Proc. Annu. Conf. West. Assoc. Fish Wildl. Agencies* 61:273-281. SFA 27(3)

82-002035 Wespestad, V. G.; S. H. Hoag and R. Narita. REDUCING THE INCIDENTAL CATCH OF PROHIBITED SPECIES IN THE BERING SEA GROUNDFISH FISHERY THROUGH GEAR RESTRICTIONS. *Int. Pac. Halibut Comm. Tech. Rep.* No. 19. p. 5-14. 1982. SFA 27(3)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112] The retention of several fully-utilized species (salmon, halibut, and crab) is prohibited in the Bering Sea groundfish fisheries. These prohibited species, however, are caught incidentally to groundfish, and the incidental catch reduces the yield available to the directed fisheries. The incidental catch of prohibited species is generally less with longlines or off-bottom trawls than with on-bottom trawls. Thus, one possible solution is to restrict the type of gear used in the groundfish fishery. This report examines the effect of restricting on-bottom trawls with respect to the production of groundfish as well as the catch of prohibited species. The results suggest that most of the available groundfish could be harvested with longlines and off-bottom trawls with a substantial reduction (over 80%) in the incidental catch of prohibited species. Allowing limited on-bottom trawling for flounders could minimize the loss of groundfish production and still provide for a reduction (over 60%) in the catch of prohibited species. Economic considerations were not examined, although the report recognizes that gear restrictions would likely increase the harvesting cost of some groundfish species.

82-002036 Witham, G. PERSPECTIVE ON MANAGEMENT OF OCEAN CHINOOK AND COHO SALMON FISHERIES WITHIN THE FISHERY CONSERVATION ZONE OFF CALIFORNIA, OREGON AND WASHINGTON. *Pac. Fish. Manage. Counc.* 28p. Mar. 1982. Available from Pac. Fish. Manage. Counc., 526 SW Mill St., Portland, OR 97201. SFA 27(3)

UTILIZATION OF FISHERY PRODUCTS

82-002037 FAO of the UN. 1980 YEAR BOOK OF FISHERY STATISTICS, FISHERY COMMODITIES VOL. 51. *FAO Fish. Ser.* 17. ix + 178p. 1981. In English, French and Spanish. SFA 27(3)
[Rome, Italy]

MISC. TECHNIQUES AND EQUIPMENT

82-002038 Baugh, T. M. TECHNIQUE FOR PHOTOGRAPHING SMALL FISH. *Prog. Fish-Cult.* 44(2):99-101. Apr. 1982. SFA 27(3)
[1020 Custer Ave., Ogden, UT 84404]

MISC. TECHNIQUES AND EQUIPMENT (CONTINUED)

82-002039 Bouck, G. R. GASOMETER: AN INEXPENSIVE DEVICE FOR CONTINUOUS MONITORING OF DISSOLVED GASES AND SUPERSATURATION. *Trans. Am. Fish. Soc.* 111(4):505-516. July 1982. SFA 27(3)
[U.S. FWS, NMFS Res. Cent., Bldg. 204, Naval Support Activity, Seattle, WA 98115]

82-002040 Dunkley, D. A. and W. M. Shearer. AN ASSESSMENT OF THE PERFORMANCE OF A RESISTIVITY FISH COUNTER. *J. Fish Biol.* 20(6):717-737. June 1982. SFA 27(3)
[Freshwater Fish. Lab., 6 California St., Montrose, Angus DD10 8DW, Scotland] Closed-circuit television was used to provide a visual record of the events associated with the counts recorded by a resistivity fish counter. The fish seen were classified as 'large' fish ≥50 cm length and 'small' fish of <50 cm. Some of the 'large' fish escaped detection by the counter, some 'small' fish were counted and some counts were registered when nothing was seen. The sensitivity of the counter varied inversely with water conductivity which varied inversely with discharge. Evidence was obtained suggesting that fish ascending a weir tend to swim closer to the bottom than do those descending. It is found that fish tended to move upstream just after sunset and downstream just before sunrise except when the water was turbid and when the fish were very close to spawning. The numbers of fish movements recorded increased during those periods when discharge was decreasing after a spate but when spawning activity was at its peak, increased activity occurred in the complete absence of any change in discharge. Instances of the same fish re-crossing the counting zone several times were recorded and the simultaneous passage of more than one fish through the counting zone were observed.

82-002041 Everest, F. H. and J. Rodgers. TWO ECONOMICAL PHOTOPERIOD CONTROLS FOR LABORATORY STUDIES. *Prog. Fish-Cult.* 44(2):113-114. Apr. 1982. SFA 27(3)
[USDA For. Serv., For. Sci. Lab., 3200 Jefferson Way, Corvallis, OR 97331]

82-002042 McKim, J. M. and R. F. Syrett. MOBILE SURGICAL TABLE WITH AUTOMATIC SOLENOID SYSTEM FOR FISHERY APPLICATIONS. *Prog. Fish-Cult.* 44(2):75-78. Apr. 1982. SFA 27(3)
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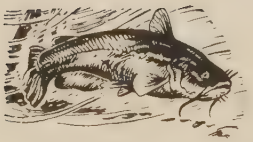

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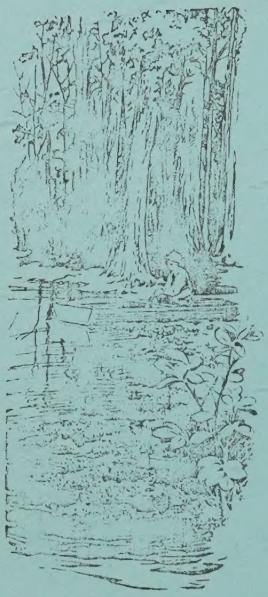

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